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ABSTRACT

This report highlights four research studies related to the Enrichment Triad Model, which encourages problem finding and problem solving in gifted students. The first study, "Academic Underachievement among the Gifted: Reversing School Failure" by Linda J. Emerick, identified six factors which influenced the reversal of the underachievement pattern in 10 gifted students (ages 14-20): curriculum and instruction, parents, teachers, personal interests and hobbies, goals associated with achievement, and changes in self. The second study, "Characteristics Related to High Levels of Creative/Productive Behavior in Secondary School Students: A Multi-Case Study" by Marcia A. B. Delcourt, investigated characteristics related to creative/productive behavior in 18 high school students and revealed that the students exhibited characteristics similar to those of creative/productive adults. The third study, "The Talents Unlimited Model and Its Effects on Students' Creative Productivity" by Jane L. Newman, investigated the effectiveness of Talents Unlimited training on 147 talented students (grades 3-6), and found that those receiving training produced better products and had a lower dropout rate. The final study, "Teachers' Attitudes toward Curriculum Compacting: A Comparison of Different Inservice Strategies" by Marcia Imbeau, involved 166 teachers (grades 1-12) and sought to determine the combination of teacher variables and staff development strategies that influence teachers' use of curriculum compacting. (Each chapter contains references.) (CR)



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Research Related to the Enrichment Triad Model

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Research Related to the Enrichment Triad Model

E. Jean Gubbins, Editor
1995

Chapter I: Academic Underachievement Among the Gifted: Reversing
School Failure

Linda J. Emerick

Chapter II: Characteristics Related to High Levels of Creative/Productive
Behavior in Secondary School Students: A Multi-Case Study

Marcia A. B. Delcourt

Chapter III: The Talents Unlimited Model and Its Effects on Students' Creative
Productivity

Jane L. Newman

Chapter IV: Teachers' Attitudes Toward Curriculum Compacting: A
Comparison of Different Inservice Strategies

Marcia Imbeau

Acknowledgments

Preparing this book on the *Research Related to the Enrichment Triad Model* prompted me to rethink some of the past and current practices in providing programs and services for students with high abilities. Having access to a model which has been researched for decades places program developers in a much better position to make decisions about total school improvement. Linda J. Emerick, Marcia A. B. Delcourt, Jane L. Newman, and Marcia Imbeau have all designed and implemented programs in school districts throughout the country, and they continue to research the effectiveness of the Enrichment Triad Model. I appreciate all their efforts to present chapters highlighting their research findings. They are excellent researchers, scholars, and most importantly—teachers.

I would also like to thank Bruce Berube, Dawn R. Guenther, Karen Logan, Judith Mathews, Amy Mullen, and Siamak Vahidi for their tireless efforts in the preparation of this book. Their input and questions about each chapter have truly enhanced the presentation.

E. Jean Gubbins

Research Related to the Enrichment Triad Model

Introduction

Over the past two decades several models in the field of gifted and talented education have been developed to provide defensible programs and services for students with high abilities. The models sometimes offer a philosophical and an organizational perspective for professionals interested in designing and developing programs specific to the needs of students in their districts. An excellent collection of models written by their developers exists in *Systems and Models for Developing Programs for the Gifted and Talented* (Renzulli, 1986). This source book also provides some preliminary information on the extent of related research on the models in action. One model featured in the book, the Enrichment Triad Model (Renzulli, 1977), has been thoroughly researched since its conception.

Components of the Enrichment Triad Model

The Enrichment Triad Model was responsive to two questions often posed by educators:

What is (or should be) different about the types of learning experiences that are advocated for gifted students?

Isn't what you are doing for the gifted also good for nearly all youngsters?
(p. 1)

Other questions can be inferred from the text. Were the high abilities of students addressed in the most appropriate ways? Was a collection of unrelated tasks and activities being offered for various lengths of time during the school day? Were the tasks and activities connected to the learning needs of the students? Such questions were not always debated in programs that did not have a model to guide the philosophical, organizational, and curricular components. The Enrichment Triad Model provides this guidance. The model offers two program objectives:

1. For the majority of time spent in the gifted programs, students will have an opportunity to pursue their own interests to whatever depth and extent they so desire; and they will be allowed to pursue these interests in a manner that is consistent with their own preferred styles of learning. (Renzulli, 1977, p. 5)
2. The primary role of each teacher in the program for gifted and talented students will be to provide each student with assistance in (1) identifying and structuring realistic solvable problems that are consistent with the student's interests, (2) acquiring the necessary

methodological resources and investigative skills that are necessary for solving these particular problems, and (3) finding appropriate outlets for student products. (Renzulli, 1977, p. 10)

The philosophical basis of the model rests on extensive research exploring the creative productivity of individuals (Renzulli, 1978). The emphasis on creative/productive behaviors meant that it was not enough for students to absorb or consume volumes of facts and figures. Such knowledge was basically inert. It could be recalled when prompted. However, was there a better way to use the knowledge base to formulate interest-based questions or problems that need to be resolved? The Triad model encourages problem finding and problem solving. It promotes an active approach to problem-based learning by casting students in the roles of young professionals who seek and create information purposefully. The components of the model are as follows:

- **Type I General Exploratory Activities**

Type I General Exploratory Activities are designed to provoke students' interests in new topics through interactions with professionals, presentations via multi-media, attendance at demonstrations or classes with community resource people, and involvement in mini-courses.

- **Type II Group Training Activities**

Type II Group Training Activities consist of cognitive-affective skills, learning how to learn skills, advanced research and reference skills, and written, oral, and visual communication skills. These process-oriented skills provide the tools for designing and implementing problem statements or research questions.

- **Type III Individual and Small Group Investigations of Real Problems**

Type III Individual and Small Group Investigations of Real Problems are a major component of the model. Students become actual investigators of interest-based problems. These problems are resolved through various methods of inquiry and the results are presented to appropriate audiences.

Building a Research Base for Identification and Programming

Research on the Enrichment Triad Model has been conducted by those interested in the creative productivity of young people and the requisite training for successful implementation. Twenty-three studies document the effectiveness of the model's components and its philosophical, organizational, and curricular approach (see Renzulli, 1994, pp. 319-322 for a summary). Detailed information about Triad and later derivatives and enhancements, known as the Revolving Door Identification

Model, Schoolwide Enrichment Model, and Schools for Talent Development, can be found in the following publications:

- Renzulli, J. S., Reis, S. M., & Smith, L. H. (1981). *The revolving door identification model*. Mansfield Center, CT: Creative Learning Press.
- Renzulli, J. S., & Reis, S. M. (1985). *The schoolwide enrichment model: A comprehensive plan for educational excellence*. Mansfield Center, CT: Creative Learning Press.
- Renzulli, J. S. (1994). *Schools for talent development: A practical plan for total school improvement*. Mansfield Center, CT: Creative Learning Press.

Over time, the original integrity of the Enrichment Triad Model has been maintained. The derivatives and the enhancements described in the later models listed above made it possible for more and more students to become engaged in escalating levels of enrichment.

Recent Research on Creative Productivity and Professional Development Strategies

Several researchers have tested the model further and their results are featured in this book entitled *Research Related to the Enrichment Triad Model*. Emerick, Delcourt, and Newman studied creative productivity of students from various perspectives. Emerick investigated underachievement by focusing on students' interests and strengths and the factors that influenced later accomplishments. Delcourt studied the creative productivity of secondary school students as a way of confirming the adult research base reviewed by Renzulli (1978) on the importance of ability, task commitment, and creativity. These three interlocking traits were the basis for a conception of giftedness that moved away from good lesson learners to creative/productive behaviors. Newman posed questions about the types of intervention and training strategies necessary to enhance the quality of students' products. She integrated the Talents Unlimited model (Schlichter, 1986) and the Enrichment Triad Model to provide students with a structured approach to lessons on creative and critical thinking skills.

Imbeau investigated the strategy of curriculum compacting which is critical to buying time for students to engage in creative productivity through Type IIIs. She worked with teachers and designed escalating levels of professional development opportunities to determine the extent and type of intervention for successful implementation. The strategies would ensure that students' academic skills would be assessed to eliminate mastered work.

Emerick, Delcourt, Newman, and Imbeau present summaries of their qualitative and quantitative research studies in their respective chapters. They refer to the various derivatives of the Enrichment Triad Model, including the Revolving Door Identification Model and the Schoolwide Enrichment Model. For convenience, the entire book is referred to as *Research Related to the Enrichment Triad Model*. Highlights of the quantitative and qualitative research studies by Emerick, Delcourt, Newman, and Imbeau follow.

Chapter I: Academic Underachievement Among the Gifted: Reversing School Failure

Linda J. Emerick

Emerick researched how the academic underachievement of gifted students can be reversed. So much of the literature on underachievers focuses on the etiology of their behaviors and interventions that would eliminate the cycle of underachievement. Few studies attended to prior creative/productive behaviors. Emerick describes how 10 gifted subjects, ages 14 to 20, moved from chronic underachievement to academic success. The six factors influencing the change were:

1. out-of-school interests
2. parents
3. goals associated with academic performance
4. classroom instruction and curriculum
5. the teacher
6. changes in self

Out-of-school interests played a critical role in reversing the underachievement pattern. When students were involved in advanced-level activities based on their interests, their desire to learn was enhanced. They began to unlearn the learned behavior of underachievement and pursue independent investigations (Type IIIs). Many of their at-home projects were similar to Type IIIs and school-related opportunities to conduct such investigations may be critical to reversing patterns of underachievement.

Emerick concludes her study by emphasizing the amount of time needed to reverse patterns of underachievement. There is no easy or immediate solution. Extensive time may be needed before signs of progress are evident.

Chapter II: Characteristics Related to High Levels of Creative/Productive Behavior in Secondary School Students: A Multi-Case Study

Marcia A. B. Delcourt

Delcourt completed a multi-case study of 18 students in grades 9-12 who exhibited high levels of creative/productive behavior from an early age. Since childhood, the students had deep-seated interests in various fields and used these interests to develop projects and products. Instrument analyses, document analysis, questionnaires, and student interviews were the data sources to determine whether the students exhibited characteristics similar to creative/productive adults. The students' giftedness was definitely manifested in performances and product development, rather than test scores. Students reported that Type I activities provoked their interests in new ideas and Type II activities exposed them to the skills needed for product development. The Type I and Type II activities supported their engagement in Type III activities. The Type III activities also provided opportunities to understand what it would be like to think and work as a practicing professional. The activities were a medium for career exploration.

Chapter III: The Talents Unlimited Model and Its Effects on Students' Creative Productivity

Jane L. Newman

Newman designed a series of Talents Unlimited training lessons focusing on productive thinking, decision making, planning, forecasting, and communication to determine the effects of the lessons on enhancing the quality of students' products and the number of students pursuing projects to completion. The skills approach of the Talents Unlimited model is a prototype for Type II training. Thus, Talents lessons were conducted to determine if a direct, structured approach to skill development would have an impact on students' Type III investigations (grades 3-6). The Talents lessons helped students to:

- identify and focus topics for investigation;
- develop inquiry skills to identify problem areas and questions for research;
- develop skills to organize and manage the implementation of investigative studies;
- learn to polish and refine products so that they represent quality beyond age and grade levels; and
- develop skills to present and evaluate their work much like real world, adult professionals.

As a result of student involvement with the structured approach to skill development, the students' products were of higher quality than those of students not exposed to the

treatment. Students involved in the treatment were also more likely to complete their products than leave their investigations uncompleted. The Enrichment Triad Model and the Talents Unlimited model offered complementary components that promoted creative productivity.

Chapter IV: Teachers' Attitudes Toward Curriculum Compacting: A Comparison of Different Inservice Strategies

Marcia Imbeau

Promoting opportunities for creative productivity to be displayed is not an easy task, given all the mandated curriculum or favored instructional strategies. Time is an issue. Involvement in Type III investigations requires extended time for students to apply methodological skills to a problem which does not have an obvious solution. Therefore, a strategy was developed to examine the strengths of students and their extent of knowledge of the planned curriculum. Curriculum compacting was created to help teachers meet the educational needs of students. Renzulli, Smith, and Reis (1982) outlined the process of modifying or streamlining the regular curriculum to eliminate mastered material and replace it with advanced level enrichment or acceleration activities.

Imbeau tested the teaching strategy of curriculum compacting with teachers representing grades 1-12. She designed escalating levels of professional development opportunities (technical assistance, peer coach, and district coach) to determine what teacher variables and professional development strategies influenced the teachers' use of curriculum compacting. The results of the study furthered the understanding of variables that inhibit or enhance the abilities of educators to use curriculum compacting as a strategy to assess students' strengths and design challenging, alternative curricular options.

Extending the Research Base on Triad

The four research studies highlighted in this book represent a small portion of the extensive research base on the Enrichment Triad Model and all its derivatives and enhancements. The studies provide research-based evidence for making decisions about how to provide challenging educational opportunities for students with high abilities. The findings of each of these studies should provide an excellent starting point for discussions related to program design, development, and evaluation at local, state, and national levels.

E. Jean Gubbins
August 1995

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**Chapter I:
Academic Underachievement Among the Gifted:
Reversing School Failure**

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ABSTRACT

Underachievement among the gifted has been a focus of research for over fifty years. With few exceptions, studies of interventions for gifted underachievers have demonstrated only limited success. This study investigated factors which influenced the reversal of the underachievement pattern in 10 gifted subjects, ages 14 to 20, who moved from chronic underachievement to academic success. Data were collected through questionnaires and in-depth interviews with the subjects. Inductive analysis was used to reveal common factors in the reversal process. Results indicated six factors that influenced the subjects: curriculum and instruction that was appropriate for the gifted, the parents, a teacher, personal interests and hobbies, goals associated with achievement, and changes in self. The reversal process was lengthy and unique for each subject. Results indicate that gifted underachievers may respond well to interventions that incorporate educational modifications which focus on their strengths and interests.

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Chapter I: Academic Underachievement Among the Gifted: Reversing School Failure

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... There is no question but that many gifted children are not motivated to learn and learn little, no matter how achievement is measured. Somehow there must be a will to learn. (Torrance, 1965, p. 73)

Loss of the "will to learn" has been a major focus of research devoted to the study of academic underachievement. While academic underachievement has been a persistent area of concern for educators, parents, and students, never has this problem been more perplexing or frustrating than in the instance of the bright child who cannot or will not perform at an academic level commensurate with his or her intellectual ability. The gifted underachiever has been described as "one of the greatest social wastes of our culture" (Gowan, 1955). Beyond this, however, there are personal wastes as well. Chances for advanced educational experiences and personal development are thwarted by a variety of personality, familial, and educational factors.

The gifted child who is an academic underachiever suffers from more than poor grades and disapproval of parents and teachers. Unfortunately, if performance in school is deemed inadequate, the child may also perceive himself or herself as inadequate in other learning experiences. As these experiences continue, a negative attitude toward school, self, and learning in general may result, and poor motivation habits may develop (Karnes, McCoy, Zehrback, Wollensheim, & Clarizio, 1963). According to Bloom (1977), "There is considerable empirical support for relating the individual's perception of his inadequacy in school learning to the development of related interests, attitudes, and academic self-concept." The strengths and potential of the gifted learner who is an academic underachiever often are ignored or go unrecognized, resulting in the student being denied appropriate educational opportunities and extinguishing curiosity and a love of learning.

Defining Underachievement Among Gifted Students

In her review of research on underachievement among the gifted, Zilli (1971) points out that the concept of giftedness and the gifted child is complex and multifaceted. Although common themes have emerged from various definitions of

giftedness, there is little agreement as to what giftedness is, how it can be identified, or how it can be enhanced (Siegler & Kotovsky, 1986). The concept and definitions of underachievement are directly associated with the concept of giftedness. As a result of this relationship, the problem of investigating underachievement among the gifted can be viewed as "less than simple" (Zilli, 1971). In fact, estimates as to the number of high ability students who are underachievers vary greatly. Gallagher (1985) reports as many as 10 to 15% of intellectually superior children may be in this category. Others report the possibility of as many as 50% or more of gifted children may not be performing in school at levels they are capable of attaining (Bachtold, 1969; Pirozzo, 1982). Regardless, indications are that chronic academic underachievement is a widespread and severe problem.

The definition of underachievement among the gifted has generally been agreed upon as that phenomenon in which the child of superior intellectual ability fails to perform at a level of academic achievement commensurate with his or her potential (Fine, 1967; French, 1959; Gowan, 1955; Raph, Goldberg, & Passow, 1966). The interpretations which exist beyond this basic concept are related in part to the definitions of giftedness discussed earlier. Definitions of the gifted underachiever come under two major categories.

Underachievement as Discrepancies Between Standardized Scores

The most widely utilized definition which designates the gifted underachiever stresses the discrepancy between the individual's standardized scores on tests of general intellectual ability and other standardized measures of academic achievement. The basis for this definition and method of identification is the opinion that giftedness is determined by results on specified measures of intellectual ability. In an example of this definition, Gowan (1955) defines the gifted child as one who has scored 129 IQ or higher on the Stanford-Binet or who is in the top 2% of the population on other standardized tests of general intelligence. In this instance, a gifted underachiever is determined to be a child with any level of performance on measures of academic achievement which places him or her a full standard deviation below the ability standing of others identified as gifted. Ziv (1977) expands this definition of the gifted child to differentiate between two levels of underachievers. Children who measure between 110 and 120 on measures of intellectual ability are labeled as "bright" underachievers, while children with scores of 130 or higher are designated as "gifted underachievers." Similar versions of the basic definition have been adopted and used extensively by other researchers (Bachtold, 1969; Karnes et al., 1963; Purkey, 1969; Saurenman & Michael, 1980; Ziv, Rimon, & Doni, 1977).

In spite of its wide use in research studies, this approach to defining and identifying the gifted underachiever has been criticized as too limiting in scope (Pirozzo, 1982; Raph et al., 1966). This criticism is the result of opinions that definitions of giftedness and underachievement among the gifted need to focus on the potential of the child, as opposed to performance on standardized tests (Whitmore,

1980). Additionally, studies that have been conducted using this category of definitions have seldom used identical cutoff scores or instruments to measure intellectual ability and achievement.

Thorndike (1963) has added to the confusion surrounding acceptance of the definition relying on exclusive use of standardized test scores. He explains that the phenomenon of test score discrepancies can be the result of test error in the instruments used. It may be that this definition of underachievement among the gifted is limited in its ability to accurately predict academic potential or performance.

Underachievement as Discrepancies Between Standardized Measures of Intellectual Ability or Achievement and Non-Standardized Measures of Academic Achievement

Another view of underachievement among the gifted describes this phenomenon as a discrepancy between a child's scores on tests of general ability or achievement and grades or other non-standardized measures of academic achievement in school (O'Shea, 1970; Pentecost & Nelson, 1975; Shaw & Dutton, 1962). Shaw and McCuen (1960) identify gifted underachievers as those who have scores of 110+ IQ on tests of intellectual ability and a grade point average below the mean GPA of other children in their class. In designating students as gifted underachievers, Whitmore (1980) bases her identification procedure partially on this definition. Gifted underachievers are defined as those who score 140+ IQ on the Stanford-Binet or WISC-R and who are performing in class below expected levels of performance based on grades and teacher observation. Whitmore also incorporates the use of scores on standardized tests of achievement to uncover further discrepancies and clarify the underachievement pattern.

Underachievement among the gifted is a "psychoeducationally cluttered" issue which can only be defined within an individual frame of reference (Newland, 1976). This conclusion has led others studying this phenomenon to include other areas of discrepancies. Several have added components which distinguish behavioral characteristics which differentiate the gifted underachiever from the gifted achiever.

Rimm (1986) combines standard procedures for defining underachievement with measurement of discrepancies in characteristics relative to achievement motivation. The *Achievement Identification Measure* (Rimm, 1985) standardizes five areas of characteristics relative to: competition, responsibility, control, achievement communication, and respect. In 1980, Whitmore also expanded the definition to include unique behavioral characteristics as part of the identification process for this population. These characteristics defined the gifted underachiever as passive, withdrawn, or aggressive. She also defined underachievement according to the pattern's duration, scope, and degree of severity. Other researchers have used modified versions of the definition (Fine, 1967; Shaw, 1959). However, few of the researchers and education experts can agree on the standardized tests to be employed,

cutoff scores which are appropriate, or types of in-class indicators of behavior. Definitions have also been criticized because of researchers' inability to rule out variables other than academic performance which may affect grades or other non-standardized measures of achievement. The objectivity of these measures has been questioned, making their reliability and validity suspect.

The task of defining underachievement among the gifted has not been successful in bringing about common understandings and agreement among experts. Newland (1976) points out those factors which have inhibited this search:

1. Perfect harmony between promise and performance seldom exists.
2. The prevalence and variety that exists among bright underachievers makes consensus difficult.
3. In spite of years of research, there exists a tremendous lack of knowledge about the gifted underachiever.

The burden of appropriately designating a child as a gifted underachiever rests with the definitions which have been developed and accepted. Research to discover those factors which may contribute to academic underachievement and to develop effective interventions to reverse the pattern has been guided by these definitions.

Research on Interventions to Reverse the Underachievement Pattern

One way to look at underachievers is that they are each in the middle of a circle of barbed wire. All the elements of their environment have contributed to the building of the wire circle—their family, friends, school, and, most important, themselves. (Gallagher, 1985)

The development of effective intervention measures to free the gifted child from the "circle of barbed wire" has been a primary concern of researchers in the field of gifted education. It is believed that, regardless of the nature of the causal factors which may have precipitated it, underachievement is essentially a learned behavior. Therefore, it can be "unlearned" (Davis & Rimm, 1985). Intervention strategies to reverse the pattern come under the categories of counseling and educational modification.

Counseling Approaches

Counseling the gifted underachiever through individual, group, or family approaches has been the most common mode for intervention to improve academic achievement levels (Zilli, 1971). It is believed by supporters of this approach that helping the gifted underachiever better understand self and his or her relation to others will lead to new perceptions. The new perceptions will, in turn, bring about change in school behavior and performance. Unfortunately, while counseling has

shown some promise as an intervention, a review of studies in the area reveals disappointing and inconclusive results.

Pentecoste and Nelson (1975) employed small group counseling to reverse academic underachievement in 160 "bright underachievers" (110+ IQ). Two counseling programs were designed for implementation; one emphasizing learning skills, the other concentrating on social problem-solving and role-playing activities. Significant changes in academic performance were not observed in either treatment group. Follow-up interviews with the subjects revealed the children saw little connection between the counseling sessions and their academic performance in the classroom. Broedal, Ohlsen, Proff, and Southard (1960) also report that similar counseling interventions bring about significant changes in acceptance of self and others, but have no impact on grades or other indications of academic achievement.

Similar failures to produce significant changes in reversing the underachievement pattern led Passow and Goldberg (1958) to conclude that it is necessary for the counselor and the teacher to be two different individuals. The gifted underachiever has difficulty in separating negative feelings regarding school from the individual involved in the intervention and the teacher/counselor may be viewed as a threatening factor. It was also found that gifted underachievers who were grouped together for counseling encouraged each other's negative attitudes.

Another reason for the failure of counseling interventions may result from targets for change being inappropriate or too limited in scope (Mitchell & Piatkowski, 1974). While insight oriented counseling is a promising intervention, any intervention which has achievement in school as its only goal or focuses on a single factor as its only function will be ineffective.

The research conducted by Mitchell, Hall, and Piatkowski (1975) indicates that focusing on several contributing factors through counseling is more effective. Fifty-nine bright, failing underachievers participated in various types of counseling interventions. Those interventions which concentrated on the factors of test anxiety reduction, study skill and habits improvement, and academic anxiety reduction show an 88% success rate with 63% of the students still achieving academically after two years. The strategies which focused on single factors were not successful.

One suggested type of intervention focuses on the child, parents, and teachers working under the guidance of a counselor or clinical psychologist. This approach has been implemented by Lowenstein (1977a) who wished to address the issue of underachievement among the general student population. However, two-thirds of the 206 subjects in his study had IQ scores of 116+ and could be designated as gifted underachievers. Using eclectic therapy and counseling techniques, Lowenstein concluded that the partnership of teacher, parent, and counselor working together, while not 100% effective, brought about the best results.

The Trifocal Approach also incorporates this form of intervention (Rimm, 1986). Components of the Trifocal Approach include changing the expectations of the three sets of participants, correcting deficit skills in the child, and modifying motivation strategies. An 80% success rate has been reported using this intervention but, as with other studies, there is little information regarding the duration of the reversal.

The family system has been the primary concern of several counseling interventions (Mink, 1964; Zuccone & Amerikaner, 1986). Perkins and Wicas (1971) incorporated counseling interventions for ninth grade underachieving males with participation of some of the subjects' mothers. There was a significant improvement in the grade point average of those whose mothers had been actively involved in the intervention process. It was found that both mother and son began to feel they shared a common problem and were less reluctant to deal with the underachievement issue. However, none of the reversals were sustained for longer than five months.

Fine and Pitts (1980) also believe family counseling is the best approach for the reversal of the underachievement pattern. Since many researchers attribute the onset of underachievement to parental attitudes and family interaction patterns, Fine and Pitts feel family counseling can be beneficial if the following guidelines are followed:

1. The family is involved in collaborative efforts through counseling intervention.
2. Meetings between parents and school personnel are arranged on a regular basis.
3. Follow-up conferences continue beyond the initial intervention sessions.

The disappointing results of their own intervention led Baymur and Patterson (1960) to conclude that one possible cause for the failure of their counseling strategies was that their subjects had not requested the counseling and had not chosen to participate in the study. Underachievement is difficult to approach through psychotherapy or counseling for just this reason—the individual must desire and see the need for change in order to enter whole-heartedly into the intervention (Bricklin & Bricklin, 1967). If the gifted underachiever sees a need for change and is given some degree of control in the intervention itself, the intervention will be effective (Gallagher, 1985). Bednar and Weinberg (1970) describe the characteristics of successful treatment programs for bright underachievers beginning college. While all the counseling interventions had mixed results, those in which the subjects had volunteered for participation experienced an 80% rate of effectiveness. The rest were categorized as dismal failures.

Counseling as an intervention to reverse the underachievement pattern has had more failures than successes. Pirozzo (1982) accounts for this record of failure by

explaining that, in most instances, counseling interventions have been of short duration and limited in scope. The underachievement pattern in the gifted child has been developing for years and, as has been shown, cannot be changed quickly. It is suggested that more extensive periods of self-discovery may prove counseling to be effective in dealing with this problem (Lowenstein, 1977b).

Educational Modifications

It has often been assumed that the underachieving gifted child is unable to adapt to the educational environment. One category of intervention to reverse the underachievement pattern looks at the educational environment's hesitancy to adapt to the gifted child. Educators frequently focus on the problems of gifted underachievers, ignoring the exceptional potential of the child (Whitmore, 1985). Interventions based on modification of the educational experience for the gifted underachiever have sought to make learning and school meaningful for him or her.

Karnes et al. (1963) used two approaches to study the effects of educational modification on underachieving gifted children. One group of bright underachievers (120+ IQ) was placed in a homogeneous class of academically achieving gifted students. Another group of high ability underachievers was placed in a class with students of varying ability levels. Results from the experiment showed that the gifted underachievers placed with high-achieving peers improved significantly academically. These underachievers also manifested gains in acceptance and intrinsic valuation by their parents. This would seem to indicate that gifted underachievers benefit in a variety of ways from placement in programs for the gifted and from modification of curriculum to emphasize their high levels of ability.

The Cupertino Project conducted by Whitmore (1980) has been described as one of the more promising interventions designed to reverse the underachievement pattern among gifted children (Dowdall & Colangelo, 1982; Tannenbaum, 1983). This intervention stresses the student-centered classroom approach with strong emphasis on motivation and mental health components. The classes, designed for elementary age gifted underachievers, were part of the district's gifted and talented program as opposed to programming for the handicapped. The heart of the project's philosophy was that the gifted underachiever needs the elements of programming for the gifted and talented more critically than do high achievers.

The goals of the Cupertino Project were to change the behavior patterns of the underachiever, to increase the child's emotional adjustment and self-esteem, to accelerate socialization, and to reduce the gap between potential and performance. The intervention classes, often self-contained, offered decision-making instruction, a flexible school day, and advanced curriculum. In order to measure the impact of the intervention, a two-year case study of participants was conducted with subsequent follow-up studies. Results showed that the primary level intervention had a 100% success rate. The intermediate level classes experienced a 50% success rate. Follow-

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up studies have indicated that such educational modification may have long-term, positive impact on the gifted underachievers.

As a result of the success of the Cupertino Project, Whitmore (1985) has identified several components which appear to help improve academic performance in gifted children:

1. Curriculum which is both challenging and meaningful;
2. Instruction which minimizes memorization and drill and which nurtures self-discipline and self-direction;
3. A group of similar ability students who can serve as intellectual peers;
4. Special services designed to assist with handicapping conditions;
5. Gifted programming and/or group counseling opportunities; and
6. Teachers who are understanding, positive, and who offer guidance.

Her conclusions are that a challenging curriculum delivered in a motivating style will significantly reduce underachievement among the gifted.

Newland (1976) states that the child who is successful in school tends to like what is learned and to like the person who is facilitating the learning. The role of the teacher in reversing the underachievement pattern has been investigated to some extent. The following two crucial factors have been suggested regarding the interaction of teacher, gifted underachievement, and academic performance: (a) students who are able to identify with the teacher perform better academically; (b) teachers with whom the students can identify are supportive, view students as individuals, and offer assistance in learning skills (Passow & Goldberg, 1958). O'Shea (1970) conducted a study of 140 gifted achievers and 144 gifted underachievers. Results of the study revealed that the important functions of the teacher are to make education a rewarding experience and to clarify the relation between school assignments and adult lives.

Another study which included high ability underachievers as well as average ability children sought to investigate the effects of teacher behavior on academic achievement (Mukhopadhyay & Chugh, 1979). Through creating awareness of the meaning of underachievement and the unique needs of the underachiever, teachers were encouraged to individualize instruction for, and give attention to the underachieving child. In addition, these teachers' own classroom performances were observed and analyzed. Subsequently, the teachers were trained to increase positive feedback and to decrease negative responses and comments to the children. Findings from this study showed an increase in the underachievers' participation in class activities and discussions, increases in positive feedback given by teachers, and a dramatic decrease in negative responses to student performance. In addition, the underachievers of all ability levels experienced significant gains in academic achievement.

While educational modification has been moderately successful in reversing the underachievement pattern, the number of instances of this form of intervention being investigated fully are few. Results of several of these studies indicate that teacher behavior as well as curricular content may be variables for improving the underachieving gifted child's academic performance.

The Need for a Better Understanding of the Reversal Process

A great deal of research has been devoted to understanding and helping the gifted underachiever. Studies have focused on identifying characteristics unique to this group, isolating causal factors, and developing effective interventions to reverse the underachievement pattern. In spite of the number of studies that have been conducted in these areas, the picture of the underachiever that has emerged is complex and often contradictory and inconclusive (Dowdall & Colangelo, 1982). With few exceptions, interventions designed and implemented by researchers to reverse academic underachievement have failed or have had limited success. It has been suggested that effective progress in the reversal of the underachievement pattern among the gifted has not been made because we have failed to sufficiently understand the individual involved and have not systematically investigated every aspect of the problem (Lowenstein, 1977a).

One aspect of academic underachievement that has not been investigated involves a unique group of gifted students. Studies by Bricklin and Bricklin (1967) indicated that some intellectually gifted children who are chronic academic underachievers "suddenly" reverse the pattern without apparent attempts at intervention by parents or educators. While experts have confirmed the existence of this population, no studies exist that have focused specifically on identifying characteristics of this group and understanding the influences and circumstances that brought about academic success.

In order to understand the process of the reversal of the underachievement pattern, it is necessary to gain some understanding of the meaning the individual attaches to the behavior itself or to the factors contributing to the behavior (Rogers, 1984). Since personality variables such as students' perceptions of the causes of outcomes in achievement situations appear to be related to school achievement (Kammer, 1986), research is needed that focuses on identifying students' perceptions in relation to academic achievement. This component is often missing from investigations related to reversing the underachievement pattern.

Discovering those factors that may contribute to above-average performance in school entails investigating bright children and young adults who have moved from patterns of underachievement to academic achievement. Therefore, the main purpose of this study was to identify those factors the gifted underachiever perceived as influential in reversing the academic underachievement pattern. The study also was

designed to provide baseline information about gifted underachievers who attained academic success in the classroom.

Method

An investigation of qualitative and quantitative methodology suggested a phenomenological approach would be appropriate for this study (Bogdan & Biklen, 1982; Lincoln & Guba, 1985). The ultimate goal of the phenomenological approach is to understand an event or experience from the subject's perspective. As stated by Barritt, Bleeker, Beekman, and Mulderij (1985):

To find meanings, we must recognize that our informants are part of social worlds, that they are caught in webs of meaning which are part of their language; and if we are to explain their lives we must try to understand how the world looks to them, from their point of view. (p. 23)

This approach to research offers alternative methods for explaining meanings of events, subsequently offering alternatives for solving problems. For this reason and due to the investigative nature of the study, the phenomenological approach was used to obtain in-depth information about the subjects, to discover their perceptions, to examine the nature and role of these perceptions in the reversal of the underachievement pattern, and to identify similarities among the subjects' perceptions.

Subjects

The subjects who participated in the study were chosen using purposeful sampling. The lack of previous information on this population necessitated locating individuals who were representative of the group. Purposeful sampling accomplished this goal. The 10 subjects selected were nominated by educators and other professionals in the field of gifted education based on the following criteria:

1. The subject demonstrated indicators of intellectual giftedness as demonstrated by any of the following: standardized achievement test scores (90th%+), scores on tests of general aptitude (125+ IQ), or other objective and subjective indicators of potential for well-above-average academic performance.
2. The subject demonstrated a sustained period of general academic underachievement (two years or longer) as supported by evidence of average or below-average academic performance. Evidence included test scores, grades, observations by educational professionals, and other methods of assessing academic performance.

3. The subject demonstrated a sustained reversal of the academic underachievement pattern (one year or longer) as evidenced by above-average academic performance. Indicators of academic achievement included test scores, grades, academic awards and honors, observations of education professionals, and other methods of assessing academic performance.

One of the goals of subject selection was to ensure variability among the participants in order to strengthen the explanatory power of the data gathered. The subjects of this study consisted of 10 young adults, ages 14 to 20, from northern New England, the Northeast, and the Southeast regions of the United States. The group was made up of 2 females and 8 males and included 2 African Americans and 8 Caucasians of varying socioeconomic backgrounds. The subjects came from urban, suburban, and rural settings.

The number of subjects participating in the study was chosen to enable the researcher to concentrate on depth and richness of data as opposed to breadth. The age range of subjects who were nominated for the study was carefully determined in order to: (1) ensure that subjects were "close" in time to the period of academic underachievement and the subsequent reversal of the underachievement pattern; and (2) increase the probability that, developmentally, the subjects would be able to reflect upon and articulate their perceptions of various aspects of these events (Kagen & Coles, 1972).

Data Collection

There were two phases in the collection of data. Phase one involved gathering information about each subject regarding biographical background, evidence of above-average intellectual ability, and history of academic performance. This phase was accomplished by the use of questionnaires for parents, nominating educators, and the subjects; follow-up written and telephone communication; and the collection of related school records for each participant. The data collected in this phase were used to verify fulfillment of criteria for participation in the study and to aid in the development of the questionnaire and interview guide used in Phase two.

Phase two of data collection involved the 10 subjects. To ensure the highest degree of accuracy regarding the perceptions of the subjects, data were collected using two methods: written responses to an open-ended questionnaire and in-depth interviews with each subject. The questionnaire was designed to provide information that would aid in the development of interview questions and to provide between-methods triangulation of subjective perceptions when used in conjunction with interview data. The interview guide approach was used in conducting interviews with each subject. Interviews were conducted over a four month period with individual sessions averaging 5 to 6 hours per subject. The number of interview sessions with each subject varied from one to three sessions, and was determined by the point at

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which data saturation was attained and by the personal request of the subject. All interviews were audio-taped and transcribed for verification by the participants and for analysis of the data.

Data Analysis

The goal of the analysis was to discover common themes in the written and oral responses of the subjects, to organize this information, and to draw conclusions about this population which could be verified and which could lead to further action (Miles & Huberman, 1984). Inductive analysis was used to identify themes and patterns in the subjects' perceptions regarding factors which influenced the reversal of the underachievement pattern. The data from the questionnaires and interviews were analyzed using a three-step data reduction process:

- Step 1: All data were read thoroughly and statements of the subjects were coded as either objective perceptions of an occurrence or subjective perceptions of the same event.
- Step 2: The perceptions of each subject were listed and organized into perceptual themes regarding the factors. The theme headings were identified and labeled by the researcher.
- Step 3: In the final stage of data analysis, the data were examined for each subject in order to identify the perceptual themes all 10 subjects held in common. This was accomplished by comparing and contrasting the themes recorded for each subject, thereby revealing similarities and variations.

It was the discovery of the common perceptual themes that revealed influential factors in the reversal of the underachievement pattern for this group of students.

Results

Analysis of questionnaire responses and interview data revealed six factors consistently addressed by all the subjects in relation to reversal of the academic underachievement pattern. These factors were labeled as: (1) out-of-school interests/activities, (2) parents, (3) the class, (4) goals associated with grades, (5) the teacher, and (6) self. While all six factors were perceived as important to the ten subjects, there were different opinions regarding the level of importance except for factors #5 and #6. These two factors were identified by all the subjects as primary in importance. These factors and the perceived role of each in helping the subjects achieve academic success are described below. Names of the subjects have been changed to ensure anonymity.

Out-of-School Interests/Activities

An interesting finding of this study not reported in previous research was that all 10 subjects had long standing out-of-school interests and activities of a decidedly intellectual or creative/productive nature. For example, Alan had constructed a science laboratory in the basement of his parents' home at age 8 and had added to it and continued to use it extensively for 7 years. Jason wrote musicals in fifth grade which were produced and performed by the high school drama club. He had also organized a dance troupe of teenagers who performed professionally. David started his own computer business in junior high, designing software and netting \$3,000 his first year. Laura had a wide range of interests and conducted her own investigations into various topics out of school. She and Chris, another subject, were also avid musicians (clarinet and drums, respectively). Nathan had constructed his own darkroom in the basement of his home and had won awards for his photography. Emily "practiced psychology," talking and listening to her friends and trying to learn about feelings and emotions. In every instance, the subjects were engaged in these and similar types of activities during and after the periods of chronic academic underachievement in school. The subjects believed their interests and hobbies helped them achieve academic success in four ways:

1. The outside interest provided an "escape" from what the subjects determined to be less than favorable school situations. As Nathan explained, "(The area of interest) is an outlet for your frustrations . . . you can't just focus on school. There is more to life than school . . . I mean, when I started getting into [photography, computers], I think that helped my school [performance], too, 'cause it gave me something to concentrate on *besides* school.' "
2. The area of interest or activity provided the subject with a sense of self-worth and success in the face of academic failure. Chris and Laura described how "good it felt" to be able to play their musical instruments. According to Chris, this was something he sometimes believed "was the only thing I knew how to do well. It kept me going." He believed performing in the school band and creating his own jazz group corresponded with academic improvements in school because it allowed him some degree of control over his life as well as being a constructive, creative endeavor.
3. Out-of-school interests were seen as an avenue for maintaining a love of learning and increasing the skills necessary to become an independent learner. Steven and James believed their educational programs did not always provide a challenge, both as a result of the curriculum and the subject's own in-school difficulties. Steven's interests in reading, math, and computer science filled the gap he thought existed—"I could find my own enrichment. School does not

need to be particularly enriching to me now." James was "involved in every extracurricular activity under the sun and a leader in several of them." All the activities were in areas of academic endeavor (math team, history club, etc.) which he believed helped satisfy his desire to learn.

4. Out-of-school interests and activities helped the subjects identify in-school learning experiences which were meaningful to them. In other words, school and academic achievement became relevant because of its usefulness in the area of personal interest. For example, Jason saw his strong interest in drama, "aspects of feelings and people," and reading as enabling him to perform well in an English class and experience academic success. He had always seen himself as a "people person" and found himself interested in this class because he enjoyed discussing the literary characters and what motivated their actions—topics which related directly to his own playwriting activities. David's statement summarized the subjects' beliefs in the power of out-of-school interests: "If you can prove you understand it, then any subject, from English to Science to History can all be related to somebody's interest. You can learn everything that would normally be taught in thirteen years following your own interests."

Parents

The subjects perceived that their parents had a positive effect on their academic performance. Parental impact appeared to have been primarily of a psychological nature, relating to the subjects' feelings of self worth. The influence of parents was expressed by Nathan when he said that "your parents can really make or break you in this kind of situation [academic underachievement]." Parents were perceived as contributing to the subjects' academic success in three ways:

1. The parents had directly or indirectly approved of and supported the subjects' out-of-school interests. In general, the subjects regarded this support as an indication that their parents valued them for more than their achievements in school. In some instances, parents had even introduced their children to their areas of interest. The subjects also believed their parents hesitated to use these interests as a means of changing their behavior. While a subject might have to spend less time on his or her out-of-school interest area in order to catch up on assignments or to study more, the interest area was never withheld completely as a form of punishment for poor performance in school.
2. The subjects indicated that their parents had maintained a positive attitude toward them, even in the face of academic failure. When Nathan found himself in academic trouble "that was really

discouraging . . . [my parents] really helped me get through some tough times . . . helped me keep it in perspective." Nathan and the other subjects believed their parents had not been discouraged and had not seen the underachievement pattern as a permanent situation. This optimistic attitude gave each of the subjects hope that he/she could succeed academically.

3. Parents of the subjects were perceived as having remained calm, consistent in behavior, and objective during the underachievement situation. The subjects also believed the parents had eventually placed the responsibility for performance in school directly on the subjects. Angry confrontations were used less and less frequently as a means for improving grades. The subjects reported initially resisting their parents' attempts to remain calm and objective. Eventually, however, they felt the shifting of responsibility to the subjects had had a positive effect on their academic performance. As Emily stated, "Well, my mom just said everything's up to me now. In some ways, I'm glad that it's more mine and it works. But in some ways, I'm not. I mean because it all depends on me now—everything!"

The Class

All of the subjects in this study perceived the structure and curriculum of academic classes to be very important in the reversal of academic underachievement. They believed the degree to which they were "interested" in the class had a direct impact on their level of achievement and motivation to succeed. Classes which were seen as having had a direct impact on reversing the underachievement pattern were described as having the following characteristics:

1. The class that had a positive influence on the subject provided opportunities for intellectual challenge and advanced studies. This type of class was frequently described as "fun." For many of the subjects, the "fun" classes were more difficult in nature and often eliminated basic course content that the students had previously mastered. They were encouraged to progress through material at a faster rate than in classes where they did not perform as well. Alan described finally being successful academically when he was allowed to "skip right over [basic science] and take college prep Biology. That part of high school worked really well for me." In addition, these classes were perceived as providing intellectual and creative challenges by "going just over the students' heads academically." All of the subjects described successful classes as more complex in nature. It was in these classes that the gifted underachieving students began to strive to improve academic performance.

2. The class that provided opportunities for independent study in areas of interest was believed to promote academic excellence. The subjects perceived assignments as "easier to complete" when they were part of a project the student had selected. Laura became excited about learning while in a high school science class "because you were expected to go on your own a bit [in learning] . . . I liked going off and working on something that way." Other subjects found the opportunity to participate in independent studies invaluable since many of the skills related to projects and interests outside the school setting.
3. Classes that included opportunities for student discussion as part of instruction were important to the subjects. All 10 expressed a need for the personal involvement that discussions provided and they believed the discussions made the content more interesting and relevant. Emily thought discussions were essential for motivating her to achieve, even if she did not participate directly. She described a "good class" for her as one in which "we get to talk about what we read with the class and the teacher and see how everyone likes it, what they think, and what they feel."
4. Class activities and assignments motivated the subjects to excel when they were "real" or relevant to the student. The subjects believed they exerted more effort in their studies when they had the opportunity to apply skills and content they had learned. One subject had failed science courses on a regular basis until she enrolled in a class that emphasized hands-on experiments. She believed she performed at a higher level because she was "doing what real scientists do . . . not just answering questions in a book and taking a test." Jason similarly believed he improved in English and Literature courses because the activities "related somehow to the world and took [the subject] out of the classroom atmosphere."
5. Classes in which the subjects were successful academically focused on the process of learning as well as the final product in the assessment of achievement. The subjects were especially delighted with classes in which traditional methods of grading were minimized. In turn, they believed they learned more and were more successful in classes where opportunities for feedback and revision were provided. Laura explained that "not being graded all the time allows me to learn at my own speed, in my own way."

Goals

The subjects agreed that grades and similar indicators of academic achievement held little or no meaning and importance for them. Most remembered earlier efforts to succeed academically as motivated primarily as a means for pleasing their parents and winning general approval. One way in which the subjects perceived themselves as able to reverse the underachievement pattern was through developing goals whose attainment was both personally motivating and was directly related to academic success. Chris described this process as a "mind game," but all the subjects attested to its importance in the reversal process.

The goals chosen to be paired with academic achievement varied from one subject to another. Entry into a particular field of study such as engineering or into a specific college or university was selected by some, while more global aspirations were chosen by others. Michael, a young African American, chose to succeed academically because his "goal was to break the stereotype of the Black teenage male who can't make good grades. And I succeeded." Other subjects believed they could improve their self-image or increase the amount of time they had for their other interests by improving their classroom performance. Steven explained that "you put a bit more time into school, you see. Otherwise, it creates lots of friction, you're tense, and it's counterproductive. Now I actually have *more* time to work on my own because there's no more hassle."

The Teacher

The students who participated in this study believed a specific teacher was the single most influential factor in the reversal of the underachievement pattern. All the subjects thought that while the previous four factors were crucial to their academic turnaround, it was the actions of, and respect for, a particular teacher that had the greatest positive impact. According to them, teachers who motivated them to learn and excel in school displayed the following characteristics:

1. The teacher identified by the subjects demonstrated that he or she cared for, and sincerely liked, the student as an individual. According to Chris, "teachers who show they care for you really make a big difference . . . the biggest contributing factor for me was that teacher who sincerely had my best interests at heart." Interestingly, "caring" teachers were described by the subjects as displaying a wide variety of often conflicting characteristics. Some caring teachers were described as soft-spoken and able to empathize with the student who was performing poorly in class. Others described gruff, abrupt, no-nonsense individuals as equally caring. According to Michael's description, his influential teacher was "very callous, really; but he just drove us to learn. I think his callousness was just an exterior. I know he really liked us." The common factor in the descriptions of the

teacher among all subjects was the *belief* that he or she was concerned for the individual.

2. The teacher was willing to communicate with the subject as a peer. The subjects described instances in which they "could really talk" to the teacher about ideas, topics of interest, and personal concerns. The teacher was viewed as an equal as well as a facilitator for learning.
3. The teacher was believed to be enthusiastic and knowledgeable about the topic taught and demonstrated a personal desire to learn more. In Chris' case, he discovered he was not only "teachable" but able to excel in class because of his admiration for his teacher's ability. This was a turning point for him in school. All subjects reported instances in which they were motivated by a teacher's love for a subject and, as a result, performed at above-average levels in subjects they did not like. As one subject stated, "If the teacher is enthusiastic enough and knows her stuff, it's just contagious—it really is."
4. The influential teacher was perceived as not being "mechanical" in methods of instruction. Usually, the subject was directly involved with the teacher during the learning process. Student participation was viewed as a top priority of the teacher. In addition, the teachers incorporated a wide range of resources and strategies beyond the textbook and lecture. One teacher was described as being a positive influence because she used videotapes to help bring the study of Irish poetry to life. The students analyzed the poems *and* the films. Another teacher was remembered for the unique items he brought from home and his travels to illustrate concepts in a science class. The subjects believed these behaviors indicated flexibility on the part of the teacher.
5. The teacher was perceived as having high but realistic expectations for the academically underachieving student. The subjects reported the influential teachers knew the students well enough to be able "to go over my head academically and make me climb the rope to that higher level." Laura explained that, for her, the teacher had also been realistic about failures. A math teacher who played a major role in Laura's academic success was perceived as having very high expectations but not expecting perfection. She believed the teacher viewed mistakes as a way to learn, not to punish. As a result, Laura found this approach changed her negative attitude toward math. At the time of this study, she was considering majoring in math in college.

Self

While it was not selected by the subjects as the most influential factor, a significant change in the individual's concept of self was viewed as necessary for the reversal of the underachievement pattern. In particular, each subject believed he or she had undergone such a change and that without this change, the other factors, while important, would have had little or no personal impact. The perceived changes in attitude toward self included the following:

1. The subject believed he or she developed more self-confidence and a positive attitude toward the underachievement situation. David believed his confidence grew from a series of small successes he experienced in and out of school. He began to feel hopeful that he could improve in academic areas as well. Other subjects believed they had overcome the detrimental effects of perfectionism in order to gain the confidence to succeed. All the subjects expressed an acceptance of, and pride in, the characteristics that made them unique.
2. The subject began to perceive academic success in school as a source of personal satisfaction and a matter of personal responsibility. The subjects expressed the belief that they had previously seen academic achievement as a way to please others. Once the process of learning in school became a personal matter, they believed they were ready to reverse the underachievement pattern. In turn, the sense of personal pride in their success led to the perception that responsibility for improved performance rested with the student. As Emily stated, "It's up to you to work it out. It's not your parents or teachers. You have to make that decision. If you don't do that, then nobody's going to be able to help you."
3. The subjects believed they had gained the ability to reflect on and understand factors that may have contributed to the underachievement pattern. They were not certain what had brought about the ability to "see the whole picture" but viewed this as very important. They believed they had reached a point in their lives where they were more aware of the relationships among the various factors that influenced performance in school.

Conclusions and Discussion

It is important to recognize the limitations of a study of this nature before proceeding further. First, the limited number of subjects who met the criteria for the study makes it difficult to generalize to other populations of gifted underachievers. Second, data collected were of a subjective nature. While every precaution was taken

to reduce bias, it is impossible to eliminate this risk entirely. However, the results of this study provide some possible insights regarding the gifted underachiever and improving his or her chances for success in school.

This study examined gifted students' perceptions of factors which contributed to the reversal of academic underachievement. Six factors were identified in common by the subjects as having a positive impact on their academic performance: out-of-school interests, parents, goals associated with academic achievement, classroom instruction and curriculum, the teacher, and changes in self. While the factors were different to some degree from the findings of other studies, the number and nature of them support the idea that underachievement and its reversal is complex and individual to each child.

The gifted underachiever who had reversed patterns of academic underachievement exhibited characteristics associated with the highly creative and gifted individual: independence of thought and judgment, willingness to take risks, perseverance, above-average intellectual ability, creative ability, and an intense love for what they were doing (MacKinnon, 1978; Renzulli, 1978; Torrance, 1981). The level of achievement occurring outside the classroom indicated that school was frequently the only place academic and creative achievement were not taking place. The subjects also expressed and displayed a need for personal involvement with, and respect for, the abilities of those directing their education.

The educational experiences in which the subjects improved or performed well were related to their out-of-school interests and were characteristic of learning situations deemed appropriate for the gifted: "real world" application of learning, minimal repetitive assignments, use of higher levels of critical thinking, and opportunities for self-initiated and self-directed learning, to name a few (Betts, 1991; Gallagher, 1985; Passow, 1982; Renzulli & Reis, 1985; Treffinger, 1986). While not all the classes in which the subjects began to improve academically were labeled as "classes for the gifted," they bore the characteristics of those in which the curriculum and instruction had been differentiated to meet the needs of the gifted learner.

Factors not previously researched as contributing to the reversal of the underachievement pattern were revealed in the study. The subjects' out-of-school interests and the role of particular teachers were regarded as major factors in improving academic performance and increasing an appreciation for learning in the school setting. Few interventions described in the literature have attributed academic success among underachievers to having very strong interests in other areas. Indeed, these interests have been seen as contributing to underachievement by distracting the child from schoolwork. Likewise, few research studies have examined the role of the teacher and his or her personal characteristics as the basis for developing effective interventions. Conclusions drawn from this study suggest that the role of the teacher and the underachiever's areas of interest need to be investigated further.

The in-school performance pattern demonstrated by the subjects suggests that the reversal of underachievement is lengthy and marked by uneven progress. The subjects expressed the expectation that there would be "steps backwards" as they moved toward academic success and records of school performance support their perceptions. This is evidenced by James who, after successfully reversing the underachievement pattern, was accepted into a major Ivy League university. He dropped out of college after two years in order to "find himself." Surprisingly, James had an "A" average at the time of withdrawal.

Implications

Academic underachievement among the gifted can no longer be regarded as only the underachiever's problem. Many factors contribute to the underachievement pattern and changes must occur in many of these areas before progress can be made (Fox, Brody, & Tobin, 1983; Rimm, 1986). While the findings of this study indicate that at least six factors need to be addressed, it is evident that intervention must begin with gaining a thorough knowledge of, and appreciation for, the individual. As a first step in meeting the needs of the underachiever, we can carefully identify the underachiever's strengths and interests as well as areas that need improvement (Whitmore, 1985). The situations described by the subjects in the study indicate that this approach can be beneficial in several ways. First, through recognizing and emphasizing the characteristics of the child that relate to his or her giftedness, educators and parents can see the child as more than a problem waiting to be fixed. A review of the literature indicates a tendency to focus on the negative aspects of underachievement such as personality factors and behaviors that contribute to poor performance. While this may help identify contributing factors or give us a rationale for concern, it may also be a disservice to the child. All the subjects of the study mentioned how a positive, optimistic attitude on the part of parents, teachers, and themselves contributed to improvement. Looking at all aspects of the child and his or her abilities may help balance or eliminate the negative and often hostile feelings which can overwhelm the underachiever and hinder progress. Second, the strengths and interests of the child can be addressed to improve performance in school. The subjects believed that when they could perceive a relationship between their own interests and learning experiences in the classroom, they were motivated to perform well. Knowledge of these strengths and interests enabled the teacher, counselor, or parent to establish this meaningful connection. Third, the identification of strengths and interests of the underachiever can pinpoint abilities which may not be evident from the student's test scores or school performance. The experiences of the subjects in this study indicate that schools may fail to investigate out-of-school interests and other indicators of potential or may identify these indicators solely as problems rather than examples of motivation and ability to learn.

Discovering and understanding the perceptions of children who are underachieving in school may be an important element in reviving motivation to

learn. The findings of this study indicate that students can, with encouragement, identify issues and concerns directing their actions. The understanding gained from identifying these perceptions can aid in developing intervention strategies or curricular modifications which will prove helpful.

The characteristics of the gifted underachiever in this study and the findings regarding the reversal process lead to several educational implications for helping this population. It would appear that efforts to change the behavior of the underachiever through punishment or negative comments at home or in school are not effective. Efforts must be made to bring about improvements by means that do not threaten the child's positive sense of self. This does not mean that student behaviors which contribute to underachievement should be overlooked or ignored. Many of the parents and teachers of the subjects provided firm and consistent guidance in areas of concern such as study habits and disruptive behaviors. However, offering the child support and encouragement, as well as explaining that the underachievement situation is never totally the result of his or her actions, can increase the child's confidence. Providing hope that improvement and modifications are possible should be a primary concern of the school and family.

Reversing the underachievement pattern may mean taking a long, hard look at the underachiever's curriculum and classroom situation. The responses and actions of the subjects in this study indicate that when appropriate educational opportunities are present, gifted underachievers can respond positively. This supports the findings of Whitmore (1980) and Butler-Por (1987) who discovered that when the gifted child is educated in the "least restrictive environment" in the school setting, underachievement is minimized. Attempts should be made continually to upgrade content and skills, minimize repetitive and redundant lessons, and provide educational challenges in the regular classroom.

In addition to the regular classroom situation, attention must be given to special educational programming for the gifted underachiever. One concern resulting from this study is that many gifted underachievers are denied access to gifted programs which are beneficial in the development of the students' interests and abilities as independent learners. Several subjects were able to participate in such programs and found the advanced opportunities for independent studies valuable in maintaining their desire to learn. We need to encourage appropriate programming for the *above-average potential* of the gifted underachiever as well as addressing deficit areas. There are several curricular and program models in gifted education which appear to be appropriate for underachievers such as those in the study. One such model is the Enrichment Triad Model (Renzulli, 1977) which promotes "gifted behavior" through independent investigations (Type IIIs). Given the strong role that personal interests played with each subject in this study, an opportunity to pursue personal interests in Type III investigations may serve the underachiever in a number of ways. The subjects in this study were engaged in similar types of projects at home. It would appear that being able to participate in such activities in school would not

only develop their talents but also provide the guidance, discipline, and connections among their abilities, interests, and school.

Parents of gifted underachievers must be offered support and opportunities to share their ideas regarding their child's education. The importance of parental support of the child and the need for positive action and attitudes makes it imperative that parents be informed of the unique needs of their child and the role they can play in the reversal process. The gifted underachiever's perceptions of acceptance at home and understanding on the part of his or her parents appears to be a key to progress.

The perceptions of the subjects suggest that a teacher who is an advocate for the underachiever has a positive effect on the child's progress in school. In fact, according to these subjects, teachers play a major role in reversing underachievement. It appears that teachers who are seen as the most willing to help and are perceived as the most effective in learning situations exhibit many of the same characteristics as the subjects—love of learning, task commitment, and personal involvement with the subject matter and the students. Intervention to reverse the underachievement pattern must take into account the impact of the teacher and utilize those individuals who can work well with this population. We need to ask not only *what* the intervention will be but also *who* will be implementing it.

A final implication resulted from this study regarding the amount of time needed to reverse the patterns of underachievement. Hopes for the development of an intervention which offers immediate and permanent reversal of the underachievement pattern may be unrealistic and may inhibit the search for effective measures. The experiences of the subjects and the research of others suggest that academic underachievement can indeed be reversed. However, because of the many factors which can influence the child, we must expect uneven progress and periodic setbacks. It may be that we have labeled useful intervention components as unsuccessful because of our failure to find a "perfect" solution. For many of the subjects, factors that contributed to school success occurred prior to actual evidence of a change in academic performance. It is important that interventions are given time to succeed and that what seem to be small signs of progress are recognized and appreciated.

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**Chapter II:
Characteristics Related to High Levels of Creative/Productive
Behavior in Secondary School Students: A Multi-Case Study**

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ABSTRACT

This study investigated characteristics related to creative/productive behavior in adolescents. These students consistently engaged in first-hand research of self-selected topics. The topics were related to activities both within or outside of school. Selection of students for this study was based upon the quantity and quality of their projects. Therefore, giftedness was viewed as being manifested in performances. In contrast to a static perspective of the gifted individual, this conception of giftedness focused on the dynamic nature of gifted behavior.

Creative/productive behavior was under investigation for two main purposes. First, to describe the phenomenon, showing that students can be producers of information as well as consumers. Second, to examine student behaviors, forming a more specific set of personal and environmental characteristics related to creative productivity.

The sample consisted of 18 students in grades 9 through 12 from four sites in the Northeast. All sites were located in typical high schools as opposed to special schools for the gifted and talented. These schools conducted programs for the gifted and talented, focused on the development of creative/productive behaviors in students. Programming included advanced placement courses, honors classes, special seminars, and mentorships, along with opportunities for individual investigations.

A qualitative analysis was conducted utilizing triangulated methodology of data sources and methods. Focusing upon student perspectives, sources constituted the family, the school, and the individual. Methods included instrument analysis, questionnaires, and a student interview. Document analysis was employed to collect school-related data pertaining to the program for gifted and talented education and to the student's academic record. Parents responded to questionnaires about family background and their perspectives of their child's creative/productive behavior. The largest segment of data was collected from students as they responded to several assessments of personality, a questionnaire regarding their creative productivity, and a series of interview questions.

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Characteristics relative to family background, educational experiences, and individual characteristics were analyzed. Results revealed that these students exhibited characteristics similar to those of creative/productive adults, that these students can be producers of information as well as consumers, and that their learning processes merit closer attention if their abilities are to be better understood by parents and educators.

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Chapter II: Characteristics Related to High Levels of Creative/Productive Behavior in Secondary School Students: A Multi-Case Study

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Introduction and Overview of the Research

The many views of giftedness reflect the needs and norms of society, the available research methodology, and the educational and philosophical preferences of each theorist. Traditionally, giftedness is perceived as a stable trait which corresponds to an IQ score of 130 or more (Horowitz & O'Brien, 1986). Since IQ is highly correlated with school achievement (Kaufman & Harrison, 1986), "gifted" students are sometimes seen as "IQ-test smart" (Sternberg, 1986, p. 144), or as "schoolhouse gifted" (Renzulli & Reis, 1985, p. 21).

In contrast to this conception, when history acknowledges gifted individuals, multiple characteristics are often cited. Research of this nature also reveals that giftedness is observed "in certain people . . . at certain times . . . under certain circumstances" (Renzulli, 1984, p. 164). This conception stresses a situation-specific perspective rather than one that is constant. Renzulli (1978) sees this type of giftedness as the manifestation of creative/productive behaviors, since a combination of characteristics are brought to bear upon an area of interest in order to investigate a real problem.

Research supporting the existence of creative/productive behavior among youths suggests a variety of characteristics which are indicative of this behavior (Milgram, 1984; Roeder, Haensly, & Edlind, 1982; Treffinger & Renzulli, 1986). Unfortunately, many of the hypothesized characteristics were generated from the studies of eminent adults. Consequently, there is a need to examine the abilities, behaviors, and circumstances specifically related to creative/productive behavior in young people.

In this study, creative/productive behavior was under investigation for two main purposes. First, to describe the phenomenon, showing that students can be producers of information as well as consumers. Second, to examine student behaviors, forming a more specific set of personal and environmental characteristics related to creative productivity. This set of characteristics included educational experiences, parent perceptions, and aspects of the student's personality. Since the best way to view creative productivity is over a period of time (Renzulli & Delcourt, 1986), this study employed the *ex post facto* form of research (Kerlinger, 1973) in

order to provide information concerning trends of behaviors within and across student cases. Other studies employing this design have often focused upon the gifted adult, with the intention of accumulating reflections over a person's life-time. Valuable information has been drawn from these investigations, but it is important to collect data closer in time to the behavior in question. In this way, results can be compared both to the literature on characteristics of gifted adults and to that on developmental stages of young people.

By studying personal and environmental characteristics of youths who pursued and completed investigations based upon their areas of interest, this phenomenon is better understood for this age group. This information may now be employed to make recommendations for the identification system, educational model, and evaluation techniques applicable to students who are eligible for these services.

Methods and Procedures

Research Design

A qualitative analysis, using multi-case studies, was conducted. In order to overcome the weaknesses and biases that prevail in a single-method research design, this study utilized triangulation of data methods and sources. This technique provides checks for both reliability and validity of collected data (Smith, 1975). Triangulation was sought within the following plan:

1. Source- the school
Methods-
 - a. document analysis- gifted program policies, documentation of student abilities and achievements
 - b. checklist of student behaviors and activities
2. Source- the student
Methods-
 - a. assessment of specific characteristics including attitudes toward school, self-concept, personality type, and self-efficacy of creative/productive behavior
 - b. questionnaire regarding the student's perceptions of his/her creative/productive behavior
 - c. structured interview schedule, tape-recorded and transcribed
3. Source- the parents
Methods-
 - a. questionnaire for family background of the student (i.e., the number of siblings, any major illnesses)
 - b. questionnaire regarding the parents' perceptions of the student's creative/productive behavior

Sample

The sample consisted of 18 students in grades 9 through 12 from four sites in the Northeast. See Table 1 for the distribution of the sample according to age and gender. All sites were recommended by experts in the field of gifted and talented education and were located in typical high schools, as opposed to special schools for the gifted. These schools conducted programs for the gifted and talented, focusing upon the development of creative/productive behavior in students.

Each employed the Enrichment Triad Model (Renzulli, 1977) where the project's origination and development are student-initiated. This model includes three types of activities:

Type I Enrichment, consisting of general exploratory activities introducing a variety of topics not ordinarily available in the regular curriculum; Type II Enrichment, including skill development activities such as problem-solving or communication skills; and Type III Enrichment, involving individual or small group investigations of real problems, based upon interest and commitment. Programming at the sites also included Advanced Placement courses, honors classes, special seminars, and mentorships, along with opportunities for individual investigations.

Table 1

Distribution of the Sample According to Grade and Gender

n = 18

Subjects	Grade			
	9	10	11	12
Females	0	1	5	2
Males	1	1	5	3
Total	1	2	10	5

At all four sites, one teacher of the gifted was selected as the coordinating teacher. Each had completed coursework in gifted and talented education. Teachers were asked to nominate students based upon three criteria. First, only high school-aged students were included in the study because their retrospective abilities provided more pertinent information for exploring creative processes over a period of time. Students from this age group have also reached a level of cognitive development in which richer forms of information are accessible through their ability to think about thinking (Piaget, 1978). Second, to assure student familiarity with the goals of the program for the gifted and talented, only subjects with four or more years of participation in the program were eligible. Third, to control for usefulness of information, students were screened according to the quality and numbers (at least 3) of their creative/productive performances. See Table 2 for examples of student projects which were used to make decisions in the nomination process.

The choice of this sampling process is not meant to suggest that creative/productive behavior is to be found only in such a small number of subjects. Its purpose, however, is to study the phenomenon through clearly established behaviors in order to come to well-formulated conclusions.

Instrumentation

The data were collected from three sources: the school; the students; the parents. All of the instruments requiring subjective responses were created in the manner described by Severy (1974). He suggests that data collection be based upon a "well-thought-out conceptualization" and that this "conceptualization can spring from a theoretical foundation, from a practical knowledge of the situation, or from other experts" (p. 6). Following this guidance, the instruments were developed from three categories of information: appropriate literature reviews, experience in teaching the gifted at the secondary school level, and interviews with students, teachers, and parents. All items were reviewed for clarity and appropriateness by representatives of the target populations and by experts in the field of gifted education. Any recommended adjustments were then made to each form. The remainder of this section will describe the instruments assessing attitudes toward school, self-concept, self-efficacy, and personality type.

The *Self Appraisal Inventory (Measures of Self-concept K-12, 1972)* and the *School Sentiment Index (Attitudes Toward School K-12, 1972)* were selected to assess self-concept and attitudes toward school, respectively. These measures were developed for a secondary school population and, within this study, were administered to students in grades 9 through 12. In order to obtain feedback regarding readability and understanding of the items, both instruments were administered to a pilot group of five high school-aged students. Considering the students' suggestions, changes were made to each instrument.

Table 2

Examples of Student Projects Used to Determine Nomination for the Study

<u>Student</u>	<u>Title/Topic</u>	<u>Product</u>	<u>Audience</u>
1	Newton's Laws of Motion	Research Paper and Experiments	Citywide Science Fair Jr. High Art Fair
	Stock Market	Game	Jr. High Social Studies Class
	Baseball Cards	Organized Collection	Collector's Conventions in the Northeast
	Newspaper	Organized and Co-edited	Jr. High Open House
2	"Dream House"	Blueprint of a Model Home to Scale	Architects and Classmates
	"Peter Pan"	Produced and Performed in a Play	Students and Parents in the District
	"The Secret of Fairyland"	Wrote, Directed and Performed in a Play	Students and Parents in the District
	Math Baseball	Computer Game	Jr. High Students
	Pediatric Physical	Organized Internship Therapy	Local Therapist
3	Humanities Seminars for G/T H.S. Students	Organized and Acted as Discussion Leader	H.S. Students, Teachers, College Profs.
	Internship at State Capitol	Organized and Served as Research Assistant	Staff and Senator at State Capitol
	Free Thought	Founded and Organized Newspaper for Student Activists	Students Throughout State
	Student Activist Conference	Organized High School Seminars	Students from Several State High Schools
4	Computer Low-Graphics	Created Short Movie on Several Linked Computers	Area Media Festival (Won Overall Prize)
	Creative Competition	Organized Team, Developed Electrical Components	Area Competition
	Holography	Created Holograms	All H.S. Students
	"Computer Simulations and Cancer Research: A New Solution to a Complex Problem?"	Researched and Wrote Paper, Developed Program Simulating Cancer Growth	Classmates, Deans and Profs. of Engineering School at the University of Southern California

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Table 2 (continued)

Examples of Student Projects Used to Determine Nomination for the Study

<u>Student</u>	<u>Title/Topic</u>	<u>Product</u>	<u>Audience</u>
5	Kung Fu Film	Wrote and Directed Video	Jr. High Classes, Teachers
	Another Kung Fu Film	Wrote and Directed Video	H.S. Classes, Teachers
	Adventure Film	Wrote and Directed Video	H.S. Classes, Teachers
	Adventure Film	Wrote and Directed Video	H.S. Classes, Teachers
6	Wrote about Typical Student Problems	Short Story	Young Author's Contest (Won Award), Local TV Show
	"Nutrition for Everyone"	Wrote and Directed Puppet Show	Primary-aged Students
	Wrote about (Outdoor) Experience	Book	Young Author's Contest (Won Award)
	Photography	Photographic Display	Local Schools, Banks, Fairs
7	Computer Graphics	Wrote Programs	Went Through Marketing Process
	Adventure Film	Wrote and Directed Video	Jr. High Students
	Musical	Produced and Performed in a Musical/Play	Elementary Students in District
	Ham Radio Operating	Computer Program to Learn Operating Commands	Local Ham Radio Operators
8	G/T Program Orientation	Video of Puppet Show	Students in all Classes
	Drama Club Play	Rewrote Play Using 13 Original Poems	Students, Community Members
	Spiritweek Competition	Wrote and Performed in a Comedy Skit	H.S. Students
	Writer's Conference	Submitted Poetry to Student Journal	Conference Participants in the Northeast
9	Portrayal of Napoleon	Performance	History Day at State and Local Conferences
	Writing	Several Short Stories	School Literary Magazine
	"The Keys to Victory"	Computer Adventure Game	H.S. Students and Teachers

Table 2 (continued)

Examples of Student Projects Used to Determine Nomination for the Study

<u>Student</u>	<u>Title/Topic</u>	<u>Product</u>	<u>Audience</u>
10	Holography	Wrote Grant to Obtain Laser	Grant Evaluators
	Holography	Created Holograms	H.S. Students, Teachers
	Orientation to G/T Program	Wrote and Created Puppet Show	Elementary Students, Parents
	Creative Competition	Created Board Game	Area Competition
11	TV Program	Hosting of a TV Program	Local Cable TV Program
	Writing	Several Poems	National Contest (Honorable Mention)
	Writing	Wrote and Illustrated a Book	Elementary School Students
	Writing/Editing	Organized and Edited a Yearbook	Jr. High Students
12	Fractal Geometry	Computer Program	State Science Fair
	Computers	Video Yearbook	H.S. Students, Parents
	"Octaves and Sine Waves"	Demonstration and Display	Local Science Fair
	Astronomy	Organized Internship	Local College Planetarium
13	Writing	Wrote and Produced a Puppet Show	Elementary School Students
	Writing	Several Poems	National Student Magazines
	Writing	Several Short Stories	National Student Magazines
14	"The Lost Forest"	Wrote and Directed a Play	Elementary School Parent Assembly
	Playwriting	Wrote, Directed, and Acted in a Play	Jr. High Students
	Writing	Organized and Edited Literary Magazine	H.S. Students
	Creative Competition	Designed a Weight-Bearing Structure	Area Competition, Local Architect

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Table 2 (continued)

Examples of Student Projects Used to Determine Nomination for the Study

<u>Student</u>	<u>Title/Topic</u>	<u>Product</u>	<u>Audience</u>
15	Psychology	Developed a Learning Center	H.S. Students
	Writing	Wrote a Play in French	Classmates
	Writing	Wrote and Performed in a Play	Elementary Students
	Computers	Wrote Program to Teach Arithmetic	Elementary Students
16	Writing	Initiated a Creative Writing Course	H.S. Students
	Writing	Wrote Several Poems	H.S. Literary Magazine
	Writing	Wrote Several Short Stories	H.S. Literary Magazine
	Writing	Wrote a Play	Local Writing Competition
17	Writing	Created a Bound Book of Poetry	Classmates
	Scenery Design	Made Original Scenery for the Nutcracker	Student and Parent Assembly
	Creative Competition	Wrote Poetry	Area Competition
18	Plant Hybridization	Growing and Selling Plants	Local Florist
	Solar Energy	Created a Solar Cooker	Students, Local Newspaper
	Computers	Wrote Several Graphics Programs	Community Fair
	Nature	Created Weekly Nature Segment for TV Show	Local Cable TV Program

The *Self Appraisal Inventory (Measures of Self-Concept K-12, 1972)* for secondary school students contains the following four subscales: general, peer, scholastic, family. The overall internal consistency value is .75, and the test-retest stability index is reported as .87. The estimates for the entire survey are satisfactory since an attitudinal measure with at least a value of .70 is acceptable (Gable, 1986). For each of the subscales, coefficients of internal consistency ranged from $r = .60$ to $r = .75$. In addition, subscale coefficients for test-retest stability indices ranged from $r = .53$ to $r = .87$ over a two-week time interval (see Table 3). Even though lower reliability figures are reported for some of the subscales, the formation of relationships between the responses to these items and the responses from the other methods of data collection is still possible. The entire survey of 62 statements was administered to the sample.

The *School Sentiment Index (Attitudes Toward School K-12, 1972)* for high school students was originally composed of 82 items within 7 categories. A selection of 59 items among the following 6 subscales were retained for the purposes of this study: general, teacher-mode of instruction, teacher-authority and control, teacher-interpersonal relationship with students, learning, peer. Items from the category of social structure and climate were deleted since they did not reflect the intent of this research. A total internal consistency coefficient of .88 was reported along with a test-retest correlation of .49, based on a two-week test-retest period. These are approximate values for the selection of 59 items. Estimates of reliability for the original subscales range from $r = .68$ to $r = .88$ for the internal consistency reliability indices and $r = .49$ to $r = .81$ for the test-retest data (see Table 4).

Starko's Self-Efficacy Scale for Creative Productivity (Starko, 1986) is composed of 20 items constituting only one dimension. This is consistent with the literature which states that self-efficacy is specifically applicable to a designated task. Field testing on junior high school students yielded an alpha reliability estimate of .92 for the entire instrument. After being reviewed for readability and appropriateness regarding this study's sample, the instrument was considered relevant for secondary school students.

Form G of the *Myers-Briggs Type Indicator (MBTI)* (Briggs & Myers, 1986) was administered to all of the subjects. Appropriate for high school students, this 126 item instrument reveals personality preferences based upon the following sets of dimensions: introversion (I)-extroversion (E), sensing (S)-intuitive (N), thinking (T)-feeling (F), and perceptive (P)-judgmental (J). All possible combinations of the eight factors create 16 personality profiles, frequently designated by four of the *MBTI* initials (e.g., ESTF).

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Table 3

Internal Consistency and Stability Estimates of the *Self Appraisal Inventory* for
Secondary School Students

Measure	Internal Consistency Index		Test-Retest Stability Index ^a	
	<u>n</u>	<u>r</u>	<u>n</u>	<u>r</u>
Total	87	.75	141	.87
General	133	.60	178	.67
Peer	128	.61	179	.62
Scholastic	101	.72	153	.53
Family	124	.74	185	.74

^a Based on a two-week test-retest period

Measures of Self-Concept K-12, 1972

Table 4

Internal Consistency and Stability Estimates of the School Sentiment Index for Secondary School Students

Measure	Internal Consistency Index		Test-Retest Stability Index ^a	
	<u>n</u>	<u>r</u>	<u>n</u>	<u>r</u>
Total	47	.88	80	.49
General ^b	72	.79	111	.68
Teacher-instruction ^b	74	.73	101	.68
Teacher-authority	75	.71	107	.65
Teacher-peers ^b	76	.76	104	.81
Learning	74	.68	104	.62
Peer	73	.71	100	.71

^a Based on a two-week test-retest period

^b Reliability estimates are approximate since one to two items have been added or deleted for the purposes of this study.

Attitudes Toward School K-12, 1972

The following internal consistency reliability estimates for male and female high school students ($N = 608$) were reported according to each set of dimensions: EI = .84; SN = .83; TF = .80; JP = .87. Test-retest reliability estimates for this population were not available. The closest sample in age was a group of seventh grade students ($N = 77$). The following test-retest reliability coefficients were reported for agreement of type categories: EI = .75; SN = .74; TF = .73; JP = .79.

Extensive research has been conducted related to the validity of the *MBTI*. Unfortunately, the age levels of the samples in these studies were not reported. Additional technical information is available in *Manual: A Guide to the Development*

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and Use of the Myers-Briggs Type Indicator (1985, pp. 175-223) by Isabel Myers and Mary McCaully.

Data Collection and Analysis

The data were collected according to methods described in the design section. Complete anonymity of all sources was assured through the use of a coding system. Sites are referred to as A, B, C, and D. Students have fictitious names and are assigned numbers 1 through 18.

Analysis of the data proceeded with the formation of case records (Patton, 1980). The unit of analysis per record was the student. Within each record, the methods of data collection functioned on a continuum from objective to subjective or nonreactive to reactive, respectively (preexisting information and documents, assessment results, questionnaires, and interview responses). The more subjective information obtained from questionnaire and interview data underwent content analysis in a search for patterns and themes (Spradley, 1979). This process was refined further by the use of *The Ethnograph*, a computer program designed to organize the "cut and paste" process of qualitative data (Seidel & Clark, 1984; Seidel, Kjolseth, & Seymour, 1988).

In order to investigate the consistency of responses, all data sources and methods were compared or triangulated (Mitchell, 1986). Following the analysis of each record, all records were compared and contrasted regarding patterns, themes, and categories (Miles & Huberman, 1984; Swanson-Kauffman, 1986). Conclusions were related to the existing literature concerning developmental psychology, adolescent and adult creative/productive behavior, age and gender comparisons, subject area preferences, parental influences, and a variety of variables related to personality.

Finally, a cross-validation technique was used to verify conclusions and recommendations. Two independent evaluators, knowledgeable in the field of conceptions of giftedness and creative/productive behavior, reviewed and critiqued the researcher's findings. These experts displayed 93% agreement on the themes and codewords describing student characteristics from the transcribed data.

Results

Summary of the Study and Major Findings

This study investigated high levels of creative/productive behavior in adolescents. These were students who consistently engaged in first-hand research of self-selected topics. These topics were related to activities both within or outside of school. The selection of students for the study was based upon the quantity and

quality of their projects. Therefore, giftedness was viewed as being manifested in performances, rather than in test scores.

This study's results describe creative productivity as it is manifested in this sample. Personal characteristics and environmental influences are examined through factors relating to the family, the school, and the individual.

Variables Related to Creative/Productive Behavior and Family Background: A Study Across Cases

This section describes similarities and differences across cases regarding socioeconomic status (SES), birth order, siblings, gender, parental support, and childhood characteristics. Data concerning family background were collected from responses to a parent questionnaire and from students' replies to specific interview questions.

Socioeconomic Status

SES was the same throughout all cases. Families were from middle-class status. This fact was assessed from the parents' educational levels and occupations. Both parents were likely to have pursued an education after high school and to be employed in a professional occupation. This was not viewed as a predictor of creative productivity in students, since all sites were located in middle-class communities.

Gender

Gender is another variable which was not considered to be a predictor of creative productivity. The distribution of gender for this sample was roughly equivalent. While these proportions were not specifically sought (males = 56%, females = 44%), further analyses, with a larger sample, would be necessary to validate this finding. Gender may, however, play a role in choice of career path. Career choices were placed into two categories, humanities (writing, acting, photography, filmmaking) and sciences (computer science, mathematics, medicine, psychology/psychiatry). From this group, only one male chose a career in the humanities, based upon his interest in film. Another male was undecided, but the rest intend to pursue careers in the areas of mathematics or science. This contrasts with three females out of eight who plan to major in mathematics or science.

Birth Order

The role of birth order with respect to gifted behavior has been reported as a significant factor by other researchers. Corroborating the findings of several earlier investigations, 78% of the subjects in this study were either the youngest child with the next sibling being much older ($n = 1$), the only child ($n = 1$), or the oldest child (n

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= 12). In contrast, Aldous (1973), Chambers (1964), and Datta (1968) found inconclusive results concerning the importance of birth order in reference to creative individuals.

Other views regarding family constellations consider ordinal position in a family to be psychological rather than chronological (Albert 1978, 1980). In fact, ordinal position for an individual case is a lifelong process. It involves all aspects of the individual's personality, family environment, and societal influences. Since a majority of subjects viewed their parents as supportive, birth order should be investigated in conjunction with the quality of family support.

Parental Support

The impact of this concept was investigated using two sources, the parents and the students. Replies to the parent questionnaire were compared with student interview responses to establish consistent patterns and themes.

When asked if they thought their parents were supportive of their projects and interests, 11 students indicated, "yes," two were in partial agreement, and four replied, "no." From the students who said that their parents were supportive, three admitted their parents thought more effort could be applied to their school work. All students in this group added that they felt free to select any topic which interested them. When the parents of these 11 students responded to their questionnaires, they also indicated being pleased with the projects that their children pursued. Many of these parents also stated that they were proud of their children, and that they encouraged these interests in their sons or daughters.

A group of three students felt their parents provided partial support. Basically, they said their parents knew of their projects but did not specifically encourage these pursuits. The parents of these three students, were able to describe their children's projects and expressed a desire for the same effort to continue. Since these students felt a lack of parental encouragement, effective communication might be improved in the future. The four students who were disappointed by the support they received from home also reported greater parental pressure to excel in school.

In general, student and parent conceptions regarding support for projects is consistent. When parents are interested in their child's performance both in and out of school, the student perceives his or her parents as being supportive. Parents viewed as nonsupportive place a greater emphasis on grades than on their child's projects.

The concept of independence was mentioned by the students as they described their freedom to choose and investigate topics. Paired with parental support, this may be viewed as *interest, yet noninterference*. For instance, students for whom this applied: knew that their parents approved of their work both in and out of school, discussed their projects with their parents, occasionally asked their parents for ideas,

and were basically unhampered in pursuing projects through their own methods. One student said that it was nice to know that no one was "looking over her shoulder all of the time" (Student 11).

Another source of potential support in the family are siblings. In this study, these individuals played little or no role in the creative/productive behavior of the 18 subjects.

Childhood Interests

Childhood includes primary and elementary school years and the period before a student entered school. In describing their childhood interests, 14 of the subjects said that they were early readers and 12 of the students had an interest in music. Table 5 lists their early interests, present areas of focus, and future career plans.

A majority of the students (13) have continued to pursue a topic of interest which was formed early in childhood. The following accounts describe some of these relationships between early interests and career plans:

Basically, it was science right from the start.
(Student 18, Possible Career—engineer, landscape architect)

I can not remember a single time when I wasn't interested in technology.
(Student 12, Possible Career—astrophysicist)

The first thing I can remember [about an early interest] was when I was ten years old. I don't know how it came about, but I realized that I love children. And I've liked science throughout my years of schooling. I just tried to look for a career that had children and science.
(Student 2, Possible Career—pediatrician or pediatric physical therapist)

My biggest childhood interest would be—"I want to fly." Just about everything in the projects has been towards that.
(Student 14, Possible Career—Navy Pilot)

I've always had an interest in money.
(Student 1, Possible Career—majoring in political science/economics)

Well, I've always been interested in politics.
(Student 3, Possible Career—civil rights activist through political science, medicine or philosophy)

Table 5

Past, Present, and Future Student Interests

<u>CHILDHOOD INTERESTS</u>											Major Area of Interest	Possible Career
S T U D E N T	^a A R T	C O L L E G I A N	H P I O S L T I O T R I Y C /S	^b M U S I C	A C T O I U V T I D T O I O E R S	R E A D I N G	S C I E N C E	S P O R T S	T R A V E L	O T H E R		
1		X	X			X				money	politics, economics	major in political sciences, economics
2	P			I						children	science, drama, children	pediatrician or pediatric physical therapist
3			X	I		X					politics	civil rights activist or doctor or philosopher
4				I		X		X			engineering, computers	aerospace engineer
5								X		TV/movies	movie-maker, script-writer	film directing, screen-writing

Art ^a - Visual Arts = V, Performing Art = PMusic ^b - Number of instruments are indicated, T = Technical aspects of music

Table 5 (continued)

Past, Present, and Future Student Interests

CHILDHOOD INTEREST											Major Area of Interest	Possible Career
S T U D E N T	^a A R T	C O L L E G I A N S	HP IO SL TI OT RI YC / S	^b M U S I C	A C T O I U V T I D T O I O E R S	R E A D I N G	S C I E N C E	S P O R T S	T R A V E L	O T H E R		
6	P				X				X		outdoor activities, photography	wildlife photographer
7				I	X	X		X		computers	swimming, computers, ham radio, outdoor activities	outdoor job or computer science or military
8	P			I		X					writing, foreign language, dancing	international relations
9			X			X		X		chess	history, writing	Air Force
10		X				X			X	Boy Scout	mathematics, holography	major in science and and mathematics

Art ^a - Visual Arts = V, Performing Art = P

Music ^b - Number of instruments are indicated, T = Technical aspects of music

Table 5 (continued)

Past, Present, and Future Student Interests

CHILDHOOD INTEREST											Major Area of Interest	Possible Career
STUDENT	a ART	COLLECTIBLES	HP IO SL TI OT RI YC / S	b MU S I C	ACT O I U V T I D T O I O E R S	R E A D I N G	S C I E N C E	S P O R T S	T R A V E L	O T H E R		
11						X				writing	writing, observing behavior	psychology or psychiatry
12				T		X	X				computers, science	astrophysicist
13				3		X				writing	writing	writing
14				1						flying	aviation, designing structures	Navy pilot
15	P			2							drama, music	psychology with hobbies in acting and music

Art ^a - Visual Arts = V, Performing Art = PMusic ^b - Number of instruments are indicated, T = Technical aspects of music

Table 5 (continued)

Past, Present, and Future Student Interests

CHILDHOOD INTEREST												
S T U D E N T	a A R T	C O L L E G I A N S	H P I O S L T I O R I Y C / S	b M U S I C	A C T O I U V T I D T O I O E R S	R E A D I N G	S C I E N C E	S P O R T S	T R A V E L	O T H E R	Major Area of Interest	Possible Career
16				1		X			TV, writing	writing	undecided	
17	V			3		X				writing, drawing, bookkeeping (summer job)	accountant	
18	V			1	X	X	X			horticulture, computers, visual arts	landscape architecture or engineer	

Art ^a - Visual Arts = V, Performing Art = PMusic ^b - Number of instruments are indicated, T = Technical aspects of music

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A lot of my interests, at an early age, came from camping. A major interest of mine is camping and wilderness survival. It's something I'm going to pursue as part of my career.

(Student 6, Possible Career—wildlife photographer)

I loved to make up little stories for my dolls. I used to always make short books. I think, later on, writing really developed from just liking the stories and doing the dolls.

(Student 13, Possible Career—writing)

I started doing some writing on my own. That's been an [early] interest. It still is an interest for me. (This student writes about herself and about her observations of other people.)

(Student 11, Possible Careers—psychologist or psychiatrist)

Students with at least two areas of concentration decided to combine their interests (i.e., wildlife photographer) or to continue with one area of focus as a career and another as a hobby.

My love for children and interest in psychological functions of the mind have inspired me to seek the attainment of a Ph.D. in psychology. I also hope to continue my involvement in theater (acting) and music (voice and guitar) which have been two of my childhood loves. (Student 15, Possible Career—psychology with hobbies in acting and music)

Given the parameters of this study, the degree to which others have influenced these students to pursue specific lines of interest is unknown. Both parents and teachers may have been instruments in distributing both attention and resources to assist in the development of specific student interests. Bloom (1982, Bloom & Sosniak, 1981) refers to these interests and proclivities as "markers." In light of the comments relating to family atmosphere, the issue of potential careers from childhood interests requires further investigation in a variety of settings and needs to be documented as the students make their career choices.

Variables Related to Creative/Productive Behavior and Educational Experiences: A Study Across Cases

This section focused upon variables concerning the student's participation in the program for the gifted and talented and in school in general. First, program selection criteria and records are reviewed. Second, an examination of student interests, attitudes, relationships, motivation, and learning patterns in relation to school is presented.

Program Selection Criteria and Student Records

All four sites base their programs upon multiple selection criteria. Even though the identification systems for each program incorporate achievement scores, IQ test scores, or grades into their criteria, they also consider "alternate pathways." This refers to nontraditional methods of selection for talented and gifted (TAG) programs. These methods consider parent, peer, and self-nomination, writing samples, and estimates of creative behavior.

No one criterion determined selection into the program at any site. If, however, an IQ cut-off score of 130 had been employed, at least six students would have been eliminated from the program for the gifted and talented. It is also interesting to note that of the 12 IQ test scores received, these ranged from values of 104 to 154 with a mean of 133. *Since all of the students qualified as high creative producers, this supports the use of multiple criteria which do not stress intelligence test scores.*

Attitudes Toward School

Regarding their attitudes toward school, students were administered the *School Sentiment Index (Attitudes Toward School K-12, 1972)*. Using a 4-point Likert response format, utilizing descriptors ranging from "strongly disagree" (1) to "strongly agree" (4). The following subscales were employed for this study: teacher-mode of instruction, teacher-authority and control, teacher-interpersonal relationship with students, learning, and peer. Students reporting lower attitudes during the student interviews also have lower scores on the inventory (see Table 6). The following passages illustrate this relationship:

I don't really know what motivates me. I guess just being able to get out of here [school] at the normal time. (Student 18)

In general, I learn everything; it's a matter of getting the homework in. I was about to give up on it all and drop out. I really didn't get much work done, and so I didn't understand anything. (Student 3)

[Regarding his relationship to teachers and school]. I don't get a big thrill out of it. (Student 5)

[What motivates you in school?] Getting out, which is not a very lofty motivation. Because in order to get out, you have to pass. That's what I'm doing, I'm just passing. (Student 16)

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Table 6

Scale and Total Scores for the School Sentiment Index

Student	T-M ^a	T-AC ^b	T-IR ^c	L ^d	P ^e	G ^f	Total
1	1.08	2.44	2.88	3.45	2.83	3.45	2.84
2	2.92	2.78	2.88	2.73	3.33	3.45	3.00
3	2.84	2.56	2.75	3.27	2.83	1.73	2.66 ^L
4	3.31	3.00	3.38	2.64	3.33	3.09	3.10
5	2.54	2.44	2.50	2.00	3.67	2.45	2.52 ^L
6	2.92	2.78	3.13	2.91	3.00	2.92	2.93
7	2.38	2.78	2.75	2.36	2.50 ^L	2.27	2.48 ^L
8	3.08	2.67	3.13	3.45	2.67 ^L	3.36	3.10
9	3.23	3.00	3.00	3.00	3.67	2.64	3.05
10	2.77	2.67	2.63	2.27	3.00	2.55	2.62
11	2.15	2.00	2.50	2.55	2.67	2.36	2.34
12	3.00	2.67	2.63	2.27	3.00	2.55	2.62
13	3.00	2.44	3.50	2.91	2.50	3.00	2.88
14	3.23	2.78	3.38	3.18	3.33	3.45	3.22
16	2.00	1.89	1.88	2.00	1.50 ^L	1.27	1.78 ^L
17	2.77	2.78	2.88	2.91	3.17	2.45	2.79
18	2.84	2.56	2.88	2.91	2.83 ^L	2.45	2.74 ^L
Min.	2.00	1.89	1.88	2.00	1.50	1.27	1.78
Max.	3.31	3.00	3.50	3.45	3.67	3.45	3.22
Mean	2.78	2.60	2.86	2.78	2.93	2.72	2.77

T-M^a - Teacher-mode of instruction

T-AC^b - Teacher-authority and control

T-IR^c - Teacher-interpersonal relations

L^d - Learning

P^e - Peer

G^f - General

L = Low scores corresponding to lower attitudes expressed during the interview

Student 7 also received low scores on all subscales of the *School Sentiment Index*. He explained that he preferred to learn using concepts, instead of the rote memorization often required for school assignments. Note that in an earlier section Students 3, 7, 16, and 18 reported lack of parental support and an increase in parental pressure to excel in school. Since these high ability students have lower attitudes toward school and are not performing to their potential in school, they fit one definition of an underachiever. This indicates the need for research with respect to parental recognition for projects, pressure to excel academically, and attitudes toward school.

Relationships

A majority of the subjects related positively to their teachers and peers. These relationships were viewed realistically, since the students recognized that they would not get along well with every teacher or in every social group. Students usually had the same group of friends over a period of several years and had several peer groups based upon their different interests (i.e., drama club participants, ham radio operators, emergency medical technicians).

These students realized that others may dislike them because they are "smart." Explaining this situation, one subject responded in the following manner:

I mean, you'll never make it in "my position." There just aren't a whole lot of people who I'm going to be able to have a prolonged relationship with, and really enjoy the relationship, you know? It's tough. (Student 12)

The same student stresses the need to understand one's abilities in relationship to others.

Like I said in the beginning, perspective is what counts. You have to see everything in perspective or you just get so deeply involved that you just can't see out. You're in a "black hole of society." (Student 12)

Student Interests in Relation to School

While most students had favorite interests in the same content areas as their most-liked school subject, few students related their independent investigations to school. Nonetheless, a consistency was noted between most-liked class, favorite project, and potential career (see Table 7). The teacher plays an important role in subject area preference. Five students related their least-liked course to their least-liked teacher. Everyone in the sample said that teachers "make a difference" in a course. This means that the teacher determines how challenging the course will be, and structures the pattern for presenting information.

Table 7

Favorite School Subject Areas and Projects Compared With Present and Future Student Interests

Students	Favorite School Subjects	Topics for Favorite Project(s)	Major Area of Interest	Possible Career
1	mathematics	writing computer programs, collecting and displaying baseball cards, research of Newton's Laws of Motion	economics and politics	political science and economics
2	biology and chemistry	developing and presenting stories to children	science, drama, children	pediatrician, pediatric physical therapist
3	history	working for peace in local and state government groups	politics	civil rights activist through medicine, writing, and philosophy
4	mathematics	a computer program related to chemical engineering, creating a battery-powered car	engineering, computers	aerospace engineer
5	English, creative writing	video filming	movie-making, script-writing	film directing, screen-writing
6	photography	photographic portfolio and displays	outdoor activities and photography	wildlife photographer
7	science, chemistry, computers	computer programs	swimming, computers, ham radio, outdoor activities	outdoor job or computer science, or military career
8	English and foreign languages	creative writing for a skit	writing, foreign languages, dancing	international relations

Table 7 (continued)

Favorite School Subject Areas and Projects Compared With Present and Future Student Interests

Students	Favorite School Subjects	Topics for Favorite Project(s)	Major Area of Interest	Possible Career
9	history	computer programming	history, writing	Air Force
10	mathematics	holographic displays	mathematics, holography	science and mathematics
11	English and social studies	writing poetry	writing, observing behavior	psychology, psychiatry
12	science	a computer program about fractal patterns	computer science	astrophysicist
13	geometry	publishing poetry, creating puppet show	writing	writing
14	science	acting in a play, designing structures for a problem-solving program	aviation, designing structures	Navy pilot
15	English, creative writing	writing and producing a play	drama, music	psychology with hobbies in acting and music
16	English, creative writing	editing a school literacy magazine, writing	writing	undecided
17	mathematics	creating a play, drawing and writing	writing, drawing, bookkeeping	accountant
18	science	all projects involving art and science	horticulture, computers, visual arts	landscape architect or engineer

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Learning

When asked about their learning processes, students said they learned best through reading, research, discussion, and application of content. Presently, these methods are not regularly and satisfactorily employed in the school setting, as reported by these students.

Factors affecting motivation in school were more often *externally oriented*, such as parental pressure for grades and pressure to get into college. Outside of school, motivation was most often *internally oriented* by interest, task commitment, and self-motivation. Not surprisingly, recommendations for improving school focused on increasing the course selection to provide advanced level courses (i.e., calculus II and creative writing II) and a variety of new topics (i.e., photography and electronics).

Variables Related to Creative/Productive Behavior and Individual Characteristics: A Study Across Cases

An exploration of individual characteristics included assessments of self-concept, self-efficacy, personality type, and project development. Project development encompassed all aspects of an investigation: getting ideas, planning, preferred circumstances for working, allocation of time and energy, major influences, role of the audience, special characteristics, advice to a new student, effects of project involvement, and overall results.

Self-concept

In general, student self-concept was above-average as indicated by scores on the *Self-Appraisal Inventory (Measures of Self-Concept K-12, 1972)*. Using a 4-point Likert response format, most scores are above a mid-point of 2.5. This is consistent with the literature which reveals a positive correlation between self-concept and high ability in students. Total scores ranged from 1.69 to 3.69 with a mean of 2.92 (see Table 8).

These favorable scores correspond to the students frequent use of positive terms when asked to describe themselves. The following terms were employed by three or more students when describing themselves: studious, active, self-motivated, outgoing, enjoys challenge, and independent.

Self-efficacy

For these 18 students, scores on *Starko's Self-Efficacy Scale for Creative Productivity* (Starko, 1986) ranged from 2.3 to 4.8 on a 5-point scale (see Table 9). The student obtaining the highest score has researched many topics on her own, and has organized activities outside of school. One of her projects was the coordination

of a regional student newspaper about current events. This same student received one of the lowest scores on the self-concept scale and describes herself as lacking in self-esteem. This case highlights the fact that an individual may be confident in being able to perform a skill or series of skills, but feel less assured in his/her self-image.

Table 8

Scale and Total Scores for the Self-Appraisal Inventory

Student	Peer	Family	Scholastic	General	Total
1	2.69	3.19	3.71	3.44	3.24
2	3.38	3.13	3.57	3.13	3.29
3	3.06	2.00	1.93	2.63	2.42
4	2.69	3.50	3.30	2.75	3.06
5	3.06	2.69	2.79	3.13	2.92
6	3.06	2.75	2.71	3.25	2.95
7	2.38	2.19	2.57	2.38	2.37
8	2.75	3.00	3.36	3.19	3.06
9	3.19	3.63	3.57	3.56	3.48
10	2.94	2.69	2.86	2.50	2.74
11	3.13	2.63	3.29	3.44	3.11
12	2.75	3.25	3.50	3.38	3.21
13	2.94	2.00	3.00	2.25	2.53
14	3.63	3.75	3.71	3.69	3.69
15	3.06	3.00	2.64	2.94	2.92
16	1.63	1.56	1.93	1.69	1.69
17	2.94	2.94	3.29	3.06	3.05
18	2.44	2.63	3.36	2.56	2.73
Min.	1.63	1.56	1.93	1.69	1.69
Max.	3.63	3.75	3.71	3.69	3.69
Mean	2.87	2.81	3.06	2.94	2.92

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Table 9

Total Scores for Starko's Self-Efficacy Scale for Creative Productivity

Student	Total Score	Area of Interest
1	4.25	politics, economics
2	4.10	science, drama, children
3	4.80	politics
4	3.60 ^a	engineering, computers
5	3.45 ^a	filmmaking, writing
6	3.40 ^a	outdoor events, photography
7	3.85	computers
8	3.80	writing, foreign languages
9	3.85	history, writing
10	3.50 ^a	mathematics, holography
11	4.15	writing, observing behavior
12	4.20	computers
13	3.90	writing
14	4.40	aviation, structural design
15	4.15	drama, music
16	2.30 ^a	writing
17	3.25 ^a	writing, drawing
18	4.15	plants, computers

Min. = 2.30

Max. = 4.80

Mean = 3.84

^a Scores falling below the group mean

Starko, 1986

The questions in this self-efficacy instrument are particularly oriented toward research methodology. Students practicing these skills on a regular basis were expected to receive higher scores on the measure. On a 5-point scale, 13 scores are above the mid-point of 3.5. Additional analyses revealed that four of the six scores which fall below the mean for this sample (3.8) were obtained by students who are not as research-oriented. These students preferred either writing, art, or photography as their major areas of interest. Two students with interests in mathematics also scored below the group mean.

Myers-Briggs Type Indicator (MBTI)

The four sets of personality preferences reported by the *MBTI* are Introvert-Extrovert, Sensing-Intuitive, Thinking-Feeling, and Judgmental-Perceptive (Briggs & Myers, 1986). Everyone in the population embodies all of these functions or attitudes to varying degrees. All possible combinations of the eight factors create 16 personality types. An individual is then characterized by one of these 16 types.

Two forms of comparison will be used to analyze the data for this sample. First, the student scores on the *MBTI* will be contrasted with the general population. Second, the distribution of types in the sample will be described in relation to the theoretical conceptions of each factor.

Table 10 lists the percentage of the types estimated for the general population and for those occurring in this sample. Despite a majority of ESTJ and ESFJ types in the general population, only one student from this study falls into each of those categories. The greatest proportion of students are classified as INTP (22.4%, $n = 4$) with 56% of the sample preferring NP ($n = 10$) and 72% classified as N ($n = 13$).

For this sample, the distribution of the 16 types appears in Figure 1. To assist in the interpretation of preferences, student areas of interest are also indicated in each of the boxes. An analysis begins by examining patterns occurring in similar columns and rows. For example, sensing types, on the left half of the table, are often characterized by their interest in and ability to manipulate tangible facts. Noting the areas of interest in these columns, students may apply this ability in their study of language (Student 8), math and general science (Student 10), computer science (Student 4), structural design (Student 14), and drama (Student 2).

Intuitive types, on the right side, prefer to consider possibilities. The students characterized by N are interested in the production of possible ideas through the areas of computer science (Student 7), writing (Students 16, 17, 5, 13, and 11), history (Student 9), politics (Students 1 and 3), science (Students 12 and 18), photography (Student 6), and music and drama (Student 15). Even though areas of interest overlap, this is a basic format for commencing an investigation of type, and additional analyses are more revealing.

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Table 10

A Comparison of the General Population With a Sample of Creative/Productive Adolescents Regarding the Myers-Briggs Type Indicator

General Populations		Sample of Creative/ Productive Students ($n = 18$)	
E (75%)	I (25%)	E (50%)	I (50%)
S (75%)	N (25%)	S (28%)	N (72%)
T ^b (60%)	F ^b (40%)	T ^b (60%)	F ^b (40%)
T ^c (35%)	F ^c (65%)	T ^c (37.5%)	F ^c (62.5%)
J (55-60%)	P (40-45%)	J (33%)	P (67%)

^a Myers & McCaulley, p. 44

^b Males

^c Females

Note. Thinking and feeling types are typically listed by gender when reporting results from the *Myers-Briggs Type Indicator*

Legend:

E = Extrovert

I = Introvert

S = Sensing

N = Intuitive

T = Thinking

F = Feeling

J = Judgmental

P = Perceptive

		SENSING TYPES		INTUITIVE TYPES	
		With Thinking	With Feeling	With Feeling	With Thinking
I N T R O V E R T S	J u d g i n g s	ISTJ n = 1 5.6% *8-Writing/ Foreign Languages	ISFJ	INFJ	INTJ n = 1 5.6%
	P e r c e p t i v e	ISTP	ISFP n = 1 5.6% 10-Math/Science	INFP n = 2 11.2% 16-Writing 17-Writing/ Visual Arts	INTP n = 4 22.4% 9-History 12-Science 18-Science 1-Econ./ Pol. Sci.
	P e r c e p t i v e	ESTP	ESFP n = 1 5.6% 4-Computers	ENFP n = 3 16.8% 5-Writing/Film 13-Writing 6-Photo/ Outdoors	ENTP n = 1 5.6% 3-Pol. Sci.
	J u d g i n g s	ESTJ n = 1 5.6% 14-Structure Design	ESFJ n = 1 5.6% 2-Drama	ENFJ n = 1 5.6% 15-Drama/Music	ENTJ n = 1 5.6% 11-Writing/ Psych.

Myers & McCaulley, 1985, p. 32

* These values correspond to student numbers indicated earlier

Figure 1. *Myers-Briggs type indicator*. Distribution of the 16 personality profiles for a sample of creative/productive secondary school students

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In agreement with MacKinnon's (1978) research of highly creative professionals, a majority of this sample (72%) prefers intuition. In addition, the mean score for N is 30 (Minimum = 9, Maximum = 51) as compared with 20.6 in a general sample of 15 to 17-year-old students ($\bar{n}$ = 2,213) and a mean of 18.9 for individuals 18 to 20 years of age ($\bar{n}$ = 5,596) (Myers & McCaulley, 1985). This increase in the magnitude of N is also consistent with MacKinnon's research.

Continuing the examination of this distribution, thinking types, in the outer columns, tend to be more logical and analytical. Interest areas clearly represent research-oriented topics. A contrast to the thinking types are the feeling types, located in the two inner columns. They are generally characterized as being more sympathetic and warm. These columns contain seven of the nine writers, musicians, and actors for this sample.

Concentrating on the lower rows, extroverts readily deal with people. Incorporating data from the interviews, students in these rows described themselves in the following terms: "I'm a born-again outgoing person" (Student 2), "I'm a people person and I need a lot of positive reinforcement" (Student 15), "There's a world out there and I want to see it" (Student 6), "I work best with people" (Student 4), "I like to be with people" (Student 13).

On the other hand, introverts were more likely to describe themselves as preferring to be alone: "I work well on my own. I'm comfortable that way. I'm one of those people" (Student 18), "I'm shy" (Student 17), "I work best alone" (Student 8).

People preferring the judgmental type are more decisive and organized than the perceptive types, who are more adaptable. The four students with the highest scores for J, mentioned that they worked at trying to be organized.

A larger percentage of the sample (67%) were perceptive types. During the interviews, many of these students described their creative/productive processes as more spontaneous, less predictable. When asked, "How do you plan one of your investigations?", responses implied less stringent planning in the sequences of behaviors. The following quotes illustrate some of their methods:

You see, I don't plan. When I'm writing, I might think of an outline of what I wanted to do. I don't go step by step. I just write and I go over it and maybe change a few things. It gets the job done. But it's certainly not ordered. I'm not saying I'm totally unstructured, I do it in sections. (Student 9)

There's no schedule. I try to break it down into smaller pieces to make it easier, but there's no formal plan that I spend hours working on to get everything straightened out and [to figure out] the amount of time I'm going to spend on everything. (Student 18)

This ability to have a goal in mind, to break a task into its component parts while maintaining a tolerance for the partial successes along the way, is a characteristic of expert problem-solvers. While all students in this study employ problem-solving behaviors to complete their projects, the students who are perceptive types, more often made a point of detailing this less structured format during their interviews. So prevalent was the concept of flexibility in these students' planning processes that the coding in the analysis procedure became "flexible strategy."

Creative/Productive Behavior Related to Student Processes and Products

This section will describe responses to interview questions based upon student processes and products. When no prior indication is given, student responses are not placed in a particular order. Explanations of the processes through which the participants gather their ideas are presented. Following this, accounts of student problem-solving processes are described and analyzed. Then, student attitudes toward completed projects are reviewed. Finally, summaries are provided regarding student perceptions of the effects of these projects over time and for the future.

Most- and Least-preferred Projects

Many students have completed projects in more than one area, yet their favorite project usually relates to their favorite school subject, present area of interest, and potential career path. This trend was illustrated in Table 6.

In describing their most liked investigations, student responses were based upon the following criteria:

1. Interest in the topic (seen as vital)
2. Self-satisfaction
3. Audience approval obtained
4. Enjoyment
5. Opportunities for creative expression
6. "It worked"
7. Learning as a result of the project
8. Usefulness of project/project met a specific need
9. The undertaking of the investigation itself was impressive
10. No pressure to succeed

Students categorized projects as least-liked by citing the following criteria:

1. Lack of group or personal commitment
2. Lack of interest in the topics
3. Inadequate amount of time for working on the project
4. Poor selection of human and material resources
5. Inadequate information or skills prior to commencing an investigation

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Getting Ideas

A majority of the subjects (15) said they investigate topics which they already like or know something about. As secondary school students, they recognize many of their strengths and weaknesses, and build upon topics which are already of interest.

After students get ideas, "think time" plays an important role in product development. One student refers to this as "mind intervention" (Student 10). The following response illustrates how a student employed incubation while deciding to investigate the difference between diamonds and graphite.

It starts out as an insignificant thing. You think: "Why is that diamond hard?" But then it will just develop . . . your mind will just keep turning the idea over and over If you get to the point where you just can't figure it out and you really want to know, then it starts to seem important to you and you think "This is something I should try and figure out." (Student 12)

Another student, who sets aside time each day for thinking, gets ideas in the following manner:

I don't . . . consciously sit down and say: "What project I am going to do next?" It . . . starts as a like, or a thought, and just turns into a project." (Student 1)

As this same student points out, incubation is more than waiting for time to pass. It is also allowing ideas to collect, looking for questions, and being receptive to possibilities. The following analogy represents his theory of idea gathering.

. . . [It's] kind of like the chance of what one atom [would become] if you only had one of them and it only [decomposed] once every million years . . . but, if you have a trillion of those atoms and each of them decays once every million years, then the chances are very good that one of them will decay in one day There are so many ideas out there that I'm bound to come up, serendipitously, with some good idea to research. But if I was just looking for one idea that just happened to have a real resounding ring to it . . . I probably wouldn't think of it. (Student 1)

These students subconsciously reflect upon topics until an idea is formulated. Students reported having "false starts" on projects, which they were able to correct in this initial thinking stage. Ideas also occur by adapting and combining concepts, applying brainstorming, and consciously collecting ideas. In the latter case, three of the writers make daily journal entries. However, a majority of the writers say they have to be in the right mood to produce their work. If procrastination interferes with a project, students use deadlines and give themselves "peptalks" in order to overcome the initial lag of starting.

After beginning a project, a few students work steadily until completion, but most take breaks along the way. These breaks are not periods of disinterest. Fourteen students reported consciously stopping work on a project in order to "get away from it." These periods of incubation occur at regular intervals during the process, as the students accomplish subtasks toward the completion of their goals.

Planning

As mentioned in an earlier section, most of the students do not regard planning in a lock-step fashion. They do not consider their approach to these activities as structured. This attitude is reflected in the following quotes:

Unstructured Procedures—

Teachers—they always have this big piece of yellow paper and you have to write up every single step. I really can't work like that . . . I just go. I'm not a person who makes plans. I just dive right in. (Student 13)

I just jump right in and work from the middle out. (Student 17)

I'll plunge right into something and do something that isn't that great and then I'll figure out how to make it better, or even go back and remake it from the start, the right way. (Student 18)

I say: "Well, I have to do this first and this is how that's going to work." There's never any time schedule. It might take me a week to do the first step. It might take me ten minutes. I don't really care either way. (Student 7)

Flexible Schedule/Process—

The ones [projects] I think out ahead of time. I say: "What should I do? What do the judges want to see?" . . . When I go through a logical process and come up with something in the end, "They want to see this" then I have trouble doing it . . . It's something that is laid out for me, instead of being my choice. (Student 12)

If you *have* to do an outline and your outline doesn't coincide with your final copy, it's hard. (Student 17)

[Is there any general process that you go through?] Not really, because I do that on school projects. I used to, at least and I didn't really seem to get it done as well. I would still get a good grade and everything, but I just didn't feel I had done as good a job as possible. (Student 1)

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[Do you know why that might have happened?] Maybe when I set up the time schedule, I would not allow any change. If I'd set it up, I'd want to do it that way. But I think it works better [when] you just come up with a couple of things to start with and then see where that takes [you] to. (Student 1)

I just try to generally find a couple of things to start with, and then wherever that leads me, that's where I go I know where I'm going, I just don't know how I'm getting there. If I find something better, I'll change it. (Student 1)

I don't think in terms of goals. I think in terms of what's interesting, what's exciting I'm more unstructured . . . in my way of thinking and [in] the way I do things. (Student 1)

There's no commitment on my . . . projects. I don't have to state what direction they are going to take right away. I can change them around or modify them. If I'm lucky, I can make some money off them. (Student 18)

This flexibility frees the students from having to produce any predetermined product. This, of course, may also free an individual from producing anything at all. Some students feel that they need not complete a project if the commitment is missing. However, if the interest and motivation are present, the projects are completed.

Particular Circumstances

When asked if they needed any particular circumstances in order to complete an investigation, fifteen students indicated specific environmental and psychological factors. A comfortable, reasonably quiet, low-pressure atmosphere headed the list. This was followed by appropriate human and material resources. Of course, the variables of time and interest were already present.

Time and Energy Spent on Projects

Given the quality and quantity of the projects, it is not surprising that these students allocate a great deal of time and energy to working on their investigations. Students reported spending approximately 1 to 10 hours a week working on a project, including thinking time. One student explained that his devotion to a project is sporadic:

If interest comes and something is really happening at a certain time, it will be a lot. It could be five hours a day, late into the night. If nothing is happening, nothing happens for weeks. (Student 7)

The time and energy spent on an investigation depends on the student's interest and commitment. Deadlines for projects may be imposed by a formal organization, but the distribution of effort is largely determined by the student.

Factors Influencing a Project

An influence is anything affecting the project, either positively or negatively. Positive influences included:

1. People—mentors, friends, classroom teachers, teachers of the gifted and talented (greatest influence)
2. Books and magazines
3. Special programs—problem-solving, writing, computer programming (helpful)
4. Satisfaction of working on and completing the project

The following were seen as negative influences:

1. Projects which don't work
2. Inadequate resources—people and materials
3. Lack of time
4. Lack of motivation and interest
5. Difficulty in acquiring needed skills

The Role of the Audience

Why is an audience necessary?

Because you don't really have anybody's comment on what you've done. If you just do it yourself, you can't really say as easily that some things should have been better, because you're looking at the fact that you worked for a long time on this, and worked really hard, so it's got to be the best possible. So it usually takes someone else, on the outside, to get you thinking about some of the mistakes that were made or things that could have been done better.

(Student 1)

Actually, it's one of the rewards, being able to explain something to somebody and having them understand it. You get a real sense of satisfaction out of being able to show your understanding for [your project] and create an understanding in other people You've just given them something. It's a gift! (Student 12)

The key is to show your work to the appropriate audience. These are people who:

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1. understand the topic
2. appreciate the student's effort
3. supply constructive criticism, not just flattery

Student Characteristics Employed While Working on Projects

Each student was asked to describe characteristics which he or she displays while working on a project. These responses included:

1. Artistic and intellectual talents (most often cited)
2. Inquisitiveness
3. Task commitment
4. Positive self-image
5. Sense of humor
6. Optimism
7. Interest
8. Risk-taking
9. Independence
10. Sense of logic
11. Capacity to organize
12. Patience
13. Originality
14. Enthusiasm
15. Nonconformism
16. "Doing my best"

Advice to a New Student

When asked to supply advice, students responded in this manner:

1. Choose a topic of *interest* (unanimous response).
2. Have task commitment "stick-to-itiveness."
3. Don't choose a topic to please other people, select something you want to do.
4. When working in groups, make certain that everyone in the group gets along and is interested in the topic.
5. If you don't like the topic, get out.

The Effects of Working on Projects

Students described positive changes over time and the effects that these projects will have on them in the future. Comments clustered in the following areas:

1. The project itself resulted in:

- a. increased interest and task commitment
 - b. improved quality of projects completed later
 - c. the ability to get more ideas
 - d. better organizational strategies
 - e. future selection of more challenging projects
 - f. the ability to accept criticism more realistically
2. Skill acquisition or development occurred in the areas of:
 - a. research
 - b. writing
 - c. communication
 - d. technical abilities
3. General personality traits showed improvement in
 - a. self-satisfaction
 - b. patience
 - c. self-assurance
 - d. responsibility
 - e. attitude toward learning
 - f. independence
 - g. enjoyment
 - h. passion for a topic
4. Potential careers were explored.

In general, changes over time and future effects as perceived by the students are positive. These effects are internalized as students report having more confidence in evaluating their own behavior. The secondary reinforcement of receiving a formal grade is rarely applied in these programs and is not important, as this student explains:

I grade myself If I really like what I'm doing, I have an "A" in myself.
(Student 2)

Why Work on This Type of Project?

Almost all students agreed on these responses:

1. interest and inquisitiveness

Why do I write [computer] programs? When I see something, and I don't know how it works, I wonder. So that may be part of it.
(Student 7)

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2. self-satisfaction
3. increased learning
4. need for challenge
5. need for self-expression

As I said, my motivation for writing is expression. If I can find something better, that's what I'm going to do. It's not something I do because I want a grade, or something I do because I want money out of it. *It's something I have to do, because if I don't, I lose those ideas. If I lose those ideas, then I don't know exactly what I have lost.* (Student 16)

There is no single answer as to why someone creates. It is a combination of variables based upon a deep interest in a particular process and a content area. It has to do with following an interest, taking advantage of personal characteristics, and knowing that you are capable of exploring new techniques and ideas.

Implications of the Study

Considering the home environment, this study highlights the need for additional research regarding parental expectations of and support for their child's interests in and out of school. This is especially warranted for above average ability students who have low attitudes toward school and report a feeling of parental pressure to excel in school.

Within the school, selection processes should truly employ multiple criteria across several categories and not use IQ as a strict cut-off in an hierarchical fashion. As this study revealed, of the 12 IQ test scores collected, the values ranged from 104 to 154 with a mean of 133. Since all of the students qualified as high creative producers, this supports the use of multiple criteria which do not stress intelligence test scores.

Concerning programs for the gifted and talented, students replied that the variety of Type I (general exploratory) activities assisted them in getting project ideas and that Type II (skill development) experiences helped them to acquire or develop skills to complete their projects. This study reinforces the value of discussing projects before their commencement and during their progress. In this way, the student has the opportunity to consider potential problems of the investigation, such as a need for special resources or skills. This may lead to an increase in the number of projects which are satisfactorily completed.

When these students compared their investigations to school subjects, they expressed a tendency to separate school-related topics from their interests outside of school. Their motivation appears more externally oriented for school activities and seems more internally oriented where self-selected topics are concerned. If teachers

want their students to become more internally oriented toward school, then they may also want to incorporate student interests into the curriculum. This concept requires additional research.

Students also reported that they were able to evaluate career possibilities within their Type III projects. This format should be explored further as a medium for career exploration at the secondary school level.

As far as secondary school programs are concerned, these students reported that they work best through reading, research, discussion, and application. They also appreciate courses which provide advanced level content, or new topics. Supplied from the responses to student interview questions, these recommendations require consideration when planning educational experiences for students who share the characteristics of this study's participants.

For this sample, an estimation of personality type provided insight into the student's ability to relate to others and to process information. This research supports the use of this particular form of inventory to provide a more complete student profile. In addition, a majority of the general population is either ESFJ or ESTJ and these are not predominant personality types for creative/productive individuals. Parents and teachers should be aware of potential differences in personality and be prepared to adapt to the "temperamental variations" (Keirsey & Bates, 1984, p. 100) of children who approach tasks in a different manner.

Considering planning skills, students' responses indicate that their methods are similar to those of expert problem-solvers. Since these students are still developing their skills, they require assistance in practicing research and planning techniques. As a study by Burns (1987) revealed, "There is value and merit in teaching students how to manage, focus, and plan a Type III investigation" (p. 129). Additional research is needed to understand the relationship between participation in programs for the gifted and talented and the process of project development.

Conclusions

This study sought to identify students who exhibited creative productivity. Characteristics relative to family background, educational experiences, and individual personality factors were analyzed. Given each student's level of involvement with the investigations and the quality of the projects, this study provides support for the concept that adolescents can be producers of information as well as consumers. Since all behavior exists on a continuum, there will certainly be students who display varying levels of the construct. While their processes and products are not always of the same level of intensity, students identified as creative producers are developing projects to their own satisfaction which are also comparable to the work of students at local, regional, state, and national levels.

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A majority of the characteristics describing creative/productive adults were also present in this sample of high creative producers. Developmentally, the students in this sample are still exploring their interests and discovering their learning patterns. As these students report, participation in their respective programs for the gifted and talented and in their investigations has assisted them in improving the quality of their projects, increasing their general skills, enhancing their personal characteristics, and exploring potential careers. As these activities continue to develop, it is hoped that these students will become creative/productive adults.

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**Chapter III:
The Talents Unlimited Model and Its Effects on Students'
Creative Productivity**

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ABSTRACT

This study investigates the integration of a set of Talents Unlimited training lessons with processes of planning, managing, and completing the investigation of a real world problem in order to examine the effects of these lessons on the quality of products and number of students who chose not to complete their products, "dropouts." Subjects included 147 Talent Pool students, grades three through six, from three school systems which implement the Enrichment Triad/Revolving Door Model and the Talents Unlimited model.

Students in the treatment group received training in applying the Talents Unlimited model to steps of investigating a real problem. Students in the control group continued to follow guidelines described in the *Schoolwide Enrichment Model* (1985) as they pursued their investigations. Data collection included tallies of the number of Type III investigations initiated, the number actually completed, and the number of student dropouts. Student products were evaluated by two independent, objective raters using the *Student Product Assessment Form* (Reis, 1981). In addition, logs and conferences were used to provide an internal check on the consistency of procedures, as well as to determine student and teacher perceptions, attitudes, and reactions to the treatment lessons.

The treatment group in comparison to the control group had a significantly lower dropout rate as measured by chi-square analysis. Results of analysis of variance procedures also showed a significant difference in the quality of products completed by students in the treatment group. Finally, qualitative analysis supported the statistical analysis and indicated favorable reactions from students and teachers toward the treatment.

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Chapter III: The Talents Unlimited Model and Its Effects on Students' Creative Productivity

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Introduction

Creative productivity as a definition of giftedness describes those aspects of human activity and involvement that result in the development of original material or products that are purposefully designed to have an impact on one or more target audiences. This conception differs from "lesson learning" giftedness in that creative/productive people put their abilities to work toward areas of study and problems that are personally relevant (Renzulli, 1986). Learning situations can be designed to promote creative productivity through experiences that emphasize the integration of information and various thinking processes (Renzulli & Reis, 1986; Schlichter, 1986).

One programming model that recognizes the teacher's role in helping students to become creative producers is the Enrichment Triad Model (Renzulli, 1977). This model defines gifted behavior as consisting of three interactive clusters of human traits. These clusters include above-average, though not necessarily superior, ability; task commitment; and creativity. According to research, creative/productive accomplishment occurs when there is an interaction among these clusters focused on a specific performance area (Renzulli, 1978).

The Triad Model provides a framework for various activities that are designed by enrichment teachers to give students the opportunity to learn how to do advanced research. Type III enrichment activities include opportunities for individual or small-group investigations of real problems. Students who display a sincere interest in a particular performance area and who demonstrate the desire to acquire an in-depth knowledge of a topic area are taught to examine a real world problem within an interest area. Such interests are often stimulated by another form of enrichment activities called Type Is. These experiences offer students exposure to content areas not normally covered in the regular classroom through speakers, field trips, books, student-teacher discussions, and interest development centers. Another type of enrichment that is a focus of the Triad Model is called Type II training. Students learn skills in higher level thinking as well as "how to" processes that real professionals employ in their respective fields.

The Talents Unlimited model (TU), which originated in 1971, is an example of Type II process training. In addition to lesson learning represented by the Academic Talent in this model, Talents Unlimited identifies five other talents or types

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of intellectual abilities that represent creative and critical thinking processes. These talents include (a) productive thinking, (b) decision making, (c) planning, (d) forecasting, and (e) communication.

The purpose of this study was to investigate the effects of the Talents Unlimited instructional model on the completion rate and quality of students' creative productivity. More specific questions include the following:

1. Will application of the Talents Unlimited model to the process of investigating real problems affect the completion rate of student products?
2. Will application of the Talents Unlimited model affect the quality of student productivity in the investigation of real problems, as measured by the *Student Product Assessment Form*?

Methods

One hundred forty-seven students in grades 3 through 6 in three school districts in Birmingham, Alabama participated in the research study. Five gifted education teachers in five schools were responsible for providing the experimental lessons to five randomly selected groups of talent pool students. All teachers in the study had received previous training in both the Talents Unlimited model and the Enrichment Triad Model.

Teachers assigned to the treatment groups were provided a manual of treatment instructions including a series of 10 sets of lessons that applied Talents Unlimited processes to those related to the investigation of real world processes and the development of real world products. Talent activities, for example, included direct instruction in interest finding, focusing, topics, finding problems, locating and using a variety of primary and secondary sources, planning the investigation, learning "how to's" of the field, setting up time-management strategies, completing products, polishing projects, finding outlets for audiences, and evaluating creative productivity.

Students progressed through the Type II training group lessons under the direction of their enrichment teachers. They were required to progress through the 10 Steps Involved in Carrying Out Type III Enrichment (Renzulli & Reis, 1985), but were compacted out of specific activities that would have been redundant or boring due to knowledge previously acquired. Students worked independently or in small groups if their investigation was being conducted jointly by several students. The student activity lessons were completed under the supervision of the enrichment teacher.

Teachers received no training in conducting the treatment lessons because of their extensive training in the Talents Unlimited and Triad/Revolving Door

Identification Model (RDIM, Renzulli, Reis, & Smith, 1981). The series of Type II lessons contained explicit instructions for teachers in addition to detailed activity lessons for students. A short orientation session, however, was presented to explain the procedures for conducting the lessons and to answer any questions concerning the study.

The five teachers assigned to the control groups guided student investigations of real problems using materials and guidelines described in the *Schoolwide Enrichment Model* (Renzulli & Reis, 1985). Teachers of both groups encouraged their students to develop quality products, and teachers involved with the treatment lessons were asked to adhere to the objectives, materials, and activities of the lessons.

The dependent variables used in the study were the number of students who chose not to complete their products (dropouts), and the quality of students' products, as measured by the *Student Product Assessment Form* (Reis, 1981). Teachers also recorded the number of student dropouts.

A 2 x 2 chi-square analysis and analysis of variance were the statistical procedures selected to analyze the research questions in the study. In addition to quantitative analysis, qualitative research techniques were combined with quantitative techniques through a process called triangulation to assess teacher and student perceptions, attitudes, and reactions to the treatment lessons. Documentation from questionnaires was first analyzed through tallying the frequency of responses for questions that could be answered by a choice of one or several predetermined responses. Responses to the more open-ended questions, in addition to information from logs and interviews, were analyzed through developing coding categories (Bogdan & Biklen, 1982).

Instrumentation

The *Student Product Assessment Form (SPAF)*, an instrument developed by Reis (1981), was used to assess the quality of student creative productivity (completed Type III products). This instrument was selected because it was the only one available that considered the differing aspects appropriate to the nature of original creative products, as specified by the Triad/RDIM. The *SPAF*, which used a Likert-type scale for scoring, operationally defined product quality by analyzing the degree of presence/absence of the following 15 factors:

1. Early statement of purpose
2. Problem focusing
3. Level of resources
4. Diversity of resources
5. Appropriateness of resources
6. Logic, sequence, and transition
7. Action orientation

8. Audience
9. Overall assessment
 - a. Originality of the idea
 - b. Achieved objectives stated in plan
 - c. Advanced familiarity with subject
 - d. Quality beyond age/grade level
 - e. Care, attention to detail, etc.
 - f. Time, effort, energy
 - g. Original contribution

The *SPAF* was the result of a comprehensive research project directed toward developing the instrument and determining its reliability and validity (Reis, 1981). Interrater agreement on individual items ranged from 86.4% to 100%. The test-retest ($r=0.96$) reliability was determined by having a group of independent raters assess the same set of student products on two separate occasions with an intervening time period between two assessments. To obtain interrater reliability (0.96), a technique described by Ebel (1951) was used to intercorrelate the rating obtained from different raters.

Two independent, objective raters were selected from teachers in the area who were not part of the study, but who had received instructions in the Triad/RDIM and were implementing the model at their respective schools. As part of the evaluation training, the two independent raters evaluated student products from schools not participating in the study and maintained interrater agreement of at least 0.75 throughout the duration of the evaluation.

Discussion of Findings

Student Dropouts

The results from the 2 x 2 chi-square analysis showed that the treatment lessons had a significant effect on the number of student dropouts. None of the students who participated in the *Talents and Type IIIs* (Newman, 1991) lessons dropped out of the study; however, approximately 21% of the students who did not receive the treatment lessons chose not to finish their Type III products. The dropout rate for the control group was similar to the results of Olenchak's (1988) research, which reported that approximately 27% of the students in his non-treatment study failed to finish their Type III investigations. Because the control had a higher than expected number of dropouts, and the treatment group had a lower than expected number of dropouts, the results were significant at the 0.001 levels.

These findings come as no surprise in light of the conclusions from the review of literature related to task commitment (Barron, 1963; Bloom, 1985; Bloom & Sosniak, 1981; MacKinnon, 1964; Nicholls, 1972; Renzulli, 1978; Roe, 1951; Terman,

1959). Individuals who demonstrate high levels of task commitment also show great amounts of interest and involvement in their chosen areas of study (Barron, 1963). In addition, many have a better sense for identifying and focusing significant problems (Zuckerman, 1979). Students in the treatment group showed statistically significant differences on the *Student Product Assessment Form* in key concept areas of problem focusing and advanced familiarity with subject. Thus, it seems logical that these two factors may have contributed to the zero dropout rate for treatment group students.

Descriptive data also supported the statistical results. Information from the student questionnaire indicated that 90% of the treatment students reported they were definitely better or may be better at identifying an interest for study. In addition, 93% of the students reported that they had improved on focusing topics, and 90% indicated they were better at identifying problems related to their research topics.

Several implications for instruction can be made regarding the findings related to reducing the number of Type III dropouts. First, it is recommended that through productive thinking and decision-making processes more direction be given to students in finding and focusing interests so that youngsters really "buy in" to a topic or problem area before they commit to a long-term project. Moreover, these processes also could be employed in helping students solve problems related to human and material resources and time management. In addition, decision-making strategies could be employed to allow students adequate time and thought in deciding if they really want to engage in the Type III process. Finally, constant nurturing of students in the Type III experience through appropriately designed activities and teacher support and direction could help to reduce the number of students who choose to drop out of a Type III investigation.

It is also important to note that during the one semester time frame of this study, 27 products were completed and submitted for evaluation by each group. Descriptive data from teacher interviews, observations, and questionnaires underlined the fact that in order to ensure quality in the process and products of a Type III investigation, teachers should limit the number of projects at any given time. Teachers in this study agreed that in addition to their other schoolwide enrichment responsibilities, they could successfully manage 5-10 Type III projects engaging 15-25 students during one semester. The implications from these findings are clear. To ensure quality in the process and products, teachers should limit the number of Type III projects at any one time and should recruit other adults such as parents, teachers, and mentors from the community to assist in the overall management of student projects.

Student Creative Productivity

The results of analysis of variance procedures showed that there were significant differences in the quality of products, as measured by the *Student Product Assessment Form* between the two groups. The total mean score for the treatment

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group was 62.681 as compared to the total mean score for the control group of 52.981. This finding was consistent with Olenchak's (1988) research, which reported a mean score of 53.21 for quality of non-treatment student products measured by the *Student Product Assessment Form*. Mean scores for the total treatment group were higher than those for the control group in 15 out of 15 key concepts, subtotal key concepts, and total key concepts.

These results are supported by the literature (Renzulli & Reis, 1985, 1986; Schlichter, 1986; Taylor, 1986), which recommended the integration of content and process for students through application of thinking skills to real world kinds of situations much more like those engaged in by adults. More specifically, the results of this study also are consistent with Schlichter's (1986) proposal that the Talents Unlimited model can be useful to teachers in guiding students to become creative producers by: (a) enhancing higher order cognitive and affective skills that can be used to identify and solve problems of interest through investigation, (b) assisting students in developing inquiry skills that can be used to pursue the investigation of real problems or the development of unique products, and (c) developing skills needed in organizing and managing the implementation of investigative studies.

These statistical results for the total treatment group also were supported by qualitative data from both students and teachers. Results from the student questionnaire indicated that 87% and above of the students reported that because of participation in the treatment, they definitely improved or maybe improved in all of the skill areas listed on the questionnaire: identifying an interest, focusing a topic, identifying problems, finding resources, deciding on products and audiences, and evaluating self. Additionally 93% of the students reported that they had improved in executing the Talents Unlimited processes as a result of the treatment experience. This finding parallels the studies of Beyer (1987), Costa (1984), Renzulli and Reis (1986), Schlichter (1986), Sternberg (1985), and Taylor (1986) who suggested that applying higher level processes to real world problem solving situations might reap more benefits for students rather than using the skills in unrelated activities.

Teachers also commented through interviews and questionnaires that the treatment lessons were "really far better than isolated, 'made up' hypothetical, Talent activities," and that the lessons encouraged "students to use the Talents for 'real life' situations and problems." Teachers also suggested that *Talents and Type IIIs* activities were "appropriate to be used successfully in the regular classroom because the activities were applicable to many subject areas, and any teacher could use them." Another suggestion was use of the guidebook as a reference tool for teachers and students in designing Talents activities. For instance, a popular Type III product for students is to design learning centers for younger students using the Talents processes in the various activities. Teachers noted that because the Talents activities in *Talents and Type IIIs* were written so clearly and were so open-ended, they could serve as models for students and teachers to use in writing Talents activities related to any content or real world problem area.

Descriptive data from teachers supported student data, which indicated that students became more skillful at executing Talents as a result of the treatment. Similar results were reported by Beyer (1987) who suggested that developing proficiency in a thinking skill or strategy requires more than simply introducing the skill and practicing it in a single context. Further instruction and guided practice in when and how to transfer the skill from the context in which it was learned to a wide variety of contexts is crucial.

Teachers mentioned decision making most often as the talent for which students showed the most improvement, noting that students learned quickly to list criteria questions and reasons which were processes that had been more difficult for them in the past. Moreover, according to teacher observations, students became more proficient in administering the process of the decision-making talent as they "really learned to establish criteria and truly weighed their choices . . . in really applying the Talents Unlimited processes." Again, these qualitative findings are consistent with those of Beyer (1987) who suggested that students are better motivated to learn a thinking skill if it is provided at a time when they feel a need to know how to use the process.

Analysis of variance was the statistical procedure used to determine if the quality of the products from the treatment group differed from those in the control group. Third grade treatment-group products earned a mean score of 61.900, as compared to a mean score of 47.125 for control group third graders. It is worth noting that treatment group product mean scores were significant in four out of seven of the key concepts of the *Student Product Assessment Form*. This section of the instrument measured the products holistically with reference to the quality, aesthetics, and function of the total product. Mean scores were significant for the following key concepts: advanced familiarity with subjects; quality beyond age/grade level; time, effort, energy; and original contribution. These findings indicated that students as young as third grade can learn to produce products that reflect quality beyond age and grade level. The mean score for the key concept, level of resources, was also significant for third grade treatment products.

There were no significant differences in the quality of products between the two groups at grades 4 and 5. Data from teacher interviews, logs, and questionnaires pointed out that although all teachers in the study were trained in the two models, there were varying degrees of teacher experience in implementing Type IIIs, as well as differing attitudes toward the Type III process. Most of the treatment teachers carefully followed the guidelines of the lessons; however, others had less experience in the model and had problems with time management, noting that they provided minimal supervision and instruction for their students. In addition, two of the control group teachers at the fourth and fifth grade levels developed and used their own 6-week mini-course on how to initiate and make Type IIIs. The mean scores of their students' products were higher than the average mean score for the control group population.

Sixth grade products showed the most significant difference in mean scores with the total mean score for the treatment group at 69.583, compared to the total mean score for the control group at 38.917. Data from interviews, logs, and questionnaires indicated that the treatment group teachers carefully implemented *Talents and Type IIIs* according to the guidelines of the study. Moreover, qualitative data from student questionnaires showed that students had very positive feelings about their involvement in the Type III process. Interviews with the sixth grade control group teacher pointed out that because of internal problems with the model, students were reluctant to go to the enrichment room to work on their Type IIIs because they were penalized for missing classwork time. Important documentation was often missing from control group students' folders, and the quality of students' products was considerably lower.

Although it was not the focus of this study to investigate the effects of the treatment lessons on students' decisions to initiate a Type III, it is worth noting that twice as many students in the treatment group (99) began Type III investigations, as compared to students in the control group (48). This finding is consistent with Burns' (1987) research that reported participation in Type II orientation lessons was significant in determining which students would begin Type III investigations. In addition, Gubbins' (1982) research showed that 90.2% of the students who did not begin a Type III indicated that they had received minimal or no training in how to focus, plan, and manage the projects. Data from the treatment group questionnaire indicated that students included activities of interest finding, focusing the interest area, and planning the project, as being among the most helpful processes for them in the Type III investigation.

Conclusions

Taylor (1986), Renzulli and Reis (1986), Schlichter (1986), and Burns (1987) proposed a synthesis of content and process in guiding students to become creative producers. This research confirms the effectiveness of integrating the Talents Unlimited process model with processes creating a bona fide product for a real audience.

The Talents Unlimited model can elaborate the Type II process strategies designed to help students as bona fide problem solvers and producers of knowledge to learn to focus, plan, and complete high quality, professional products. More specifically, through application of the Talents (especially decision making, planning, and productive thinking), students can learn to:

- identify and focus topics for investigation;
- develop inquiry skills to identify problem areas and questions for research;

- develop skills to organize and manage the implementation of investigative studies;
- learn to polish and refine products so that they represent quality beyond age and grade levels; and
- develop skills to present and evaluate their work much like real world, adult professionals.

Conversely, through the process of applying the Talents processes to real world situations, students can sharpen their skills in productive thinking, decision making, planning, forecasting, and communications.

Integration of the Talents Unlimited processes with steps of conducting Type III investigations also can minimize the dropout rate by assisting students in identifying topics that are important and have meaning for them. Further, through Talent processes, students can learn to identify appropriate human and material resources and to develop time management plans to help keep their investigation focused and on track. Finally, through completing the process, students can learn task commitment as they develop strategies for perseverance and hard work.

Descriptive data documented the importance of linking knowledge with thinking processes. Teachers noted that because the activities provided students with opportunities to synthesize knowledge with learning how-to-learn skills, the treatment lessons afforded students experiences that were more significant in encouraging students to use the Talents Unlimited model for real-life situations and problems than teaching Talents Unlimited as discrete skills in hypothetical, unrelated exercises.

Another conclusion that related to the duration of this study was supported consistently by descriptive data from both students and teachers. Type III investigations for some students may take longer than a semester to complete due to the nature and complexity of the problem/study. Therefore, situations that rush students through the creative process can be quite frustrating to both students and teachers alike.

Finally, it is erroneous to conclude that even though teachers have received training in the Enrichment Triad Model and Talents Unlimited model that they are committed to nurturing the creative productivity of youngsters through a Type III investigation. Variables such as teacher attitudes, teaching styles, and lack of administrative support can inhibit the development of creative productivity in youngsters.

Implications for Instruction

Based on the evaluation of the quantitative and qualitative data in this study, the following implications for programming are made:

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1. Younger students and students new to the Type III process could benefit from a more direct, structured approach in working through the *Talents and Type III's* lessons, whereas students more familiar with the process can be successfully compacted out of activities that cover processes they already know.
2. Teachers should participate in staff development training on the Type III processes based on their experiences and expertise. It is important that teachers go through the Type III processes themselves so that they thoroughly understand how to focus a topic, develop a hypothesis, and develop a time-management plan. Less experienced teachers, teachers with more random learning styles, or teachers who do not feel comfortable with the research process may need more technical assistance in addition to initial training until they feel they have achieved "executive control" of the various steps in the process.
3. Teachers cannot manage large numbers of Type III investigations and still maintain quality in the process. Therefore, teachers should recruit other adults such as parents and mentors to assist with the overall management of student projects.
4. Teaching styles of teachers were reflected in types and quality of student products. For instance, while one teacher's students produced several slide shows as end products, another teacher's students created games or videotaped oral presentations. Sharing of products among school systems might help teachers encourage more variety in student products.
5. Teachers also should share successful techniques for guiding students through specific stages of the process. For instance, one teacher might be excellent at helping students to focus topics, while another might be more successful at encouraging students to polish and refine their products to a professional quality. Sharing expertise would benefit both teachers and students alike.
6. Type III fairs should be organized among systems so that students and teachers can see the differences in the quality of Type III processes, as well as in the accompanying forms and paperwork. Research has shown that students learn through vicarious association with work of other students. Observing the work of other students could help inexperienced students and teachers better understand the components of a Type III investigation and the resulting professional product.

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Chapter IV:
Teachers' Attitudes Toward Curriculum Compacting:
A Comparison of Different Inservice Strategies

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ABSTRACT

Although a specific teaching strategy, called curriculum compacting, exists to assist teachers in providing high ability students with an appropriate and a challenging curriculum, the empirical evidence to support this practice has not been examined. One reason for the lack of empirical support for the use of curriculum compacting is limited teacher use of the procedure. The purpose of this study was to determine the combination of teacher variables and staff development strategies that influence teachers' use of curriculum compacting.

A quasi-experimental design (non-equivalent control group) was used in this study to examine three different treatment groups and one control group of teachers. One hundred and sixty-six teachers representing grade levels 1-12 within a large, urban school district comprised the sample. Teachers in the control group did not receive any training or follow-up assistance. Teachers in the treatment groups received a full day of inservice training by the researcher and different types of follow-up assistance during the second semester of the school year. Follow-up assistance involved contact with the researcher to provide technical assistance and encouragement for Group 1, teacher to teacher coaching (peer coaching) for Group 2, and district program specialists coaching (district coach) for Group 3.

Hierarchical multiple regression analyses were used to examine the manner and degree to which the number of years of teaching experience, number of graduate gifted education credits, ratings of compactors, pretest attitude scores, and group membership affected the posttest attitude scores toward making curricular modifications. An instrument developed by the researcher, the *Curricular Modification Survey*, was used to assess teachers' attitudes toward curricular modifications. The results of the regression analyses indicated that group membership was a significant predictor of posttest teachers' attitudes when treatment Group 1 and the ratings of compactors were eliminated ($p < .05$). Follow-up t-tests using adjusted means revealed that treatment Group 2 (peer coaching) was significantly different from the control group ($p < .05$).

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Chapter IV:
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Introduction

One of the most frequently mentioned characteristics of above average students is their ability to finish classwork quickly and easily and consequently become bored with routine tasks (Betts, 1986; Clifford, Runions, & Smythe, 1986; Feldhusen & Kolloff, 1986; Renzulli & Reis, 1985; Starko, 1986; Treffinger, 1986). A teaching technique designed to address this problem for this population is curriculum compacting. According to Renzulli and Reis (1985), curriculum compacting is defined as a process for "modifying or 'streamlining' the regular curriculum in order to eliminate repetition of previously mastered material, upgrade the challenge level of the regular curriculum, and provide time for appropriate enrichment and/or acceleration activities while ensuring mastery of basic skills" (p. 222). This instructional strategy assists teachers in assessing specific areas of the curriculum in which students may already be proficient, provides guidance for curricular modification and allows more time to be spent on alternative work that is more challenging. A complete description of this procedure can be found in Reis, Burns, and Renzulli (1991), Renzulli and Reis (1985), Renzulli and Smith (1979), and Renzulli, Smith, and Reis (1982).

Classroom teachers usually become aware of this process through inservice meetings organized by their school district. However, staff development specialists have suggested that actual use of a new practice or an innovation in the classroom requires additional follow-up assistance for teachers to implement the process effectively (Guskey, 1986; Hord, Rutherford, Huling-Austin, & Hall, 1987; Joyce & Showers, 1982, 1983, 1987). In addition, the attitudes held by classroom teachers toward an innovation may affect how successfully they use the new procedure (Guskey, 1986; Loucks-Horsley, in press). These issues were explored in this study as they applied specifically to teachers implementation of curriculum compacting.

Theoretical Framework

Statement of the Problem

The problem addressed in this study is twofold. First, research has reported that above average students are required to spend time in school doing assignments

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they already know how to do because teachers follow an outline prescribed by textbooks without consideration of students' capabilities or previous mastery (Educational Products Information Exchange Institute, 1979; Reed, 1987; Starko, 1989; Taylor & Frye, 1988). This practice leads to frustration for students who become bored by repetitive material and are not in a position to suggest alternative assignments, and for teachers who are not aware of specific strategies to use in meeting the needs of advanced ability students (Reis et al., 1991; Renzulli, Smith, & Reis, 1982). While educators may be concerned with the effects that curriculum compacting has on students' achievement or students' attitudes toward school, research must first examine effective methods of encouraging teachers' use of the procedure before such effects can be studied.

A second component of the problem suggests that the traditional staff development strategy of a single workshop to teach instructional processes like curriculum compacting has limited effectiveness (Joyce & Showers, 1987). Inherent in this component are teacher variables that influence staff development efforts to teach teachers new practices. These variables include teachers' attitudes toward and concern for the new practice, previous training, grade levels taught, and years of teaching experience. The problem addressed in this study is, therefore, what combination of teacher variables and staff development strategies encourage teachers' use of curriculum compacting so that the individual instructional needs of high ability students are met in the classroom?

Background of the Study

The research on effective staff development practices in education suggests four key concepts that a successfully implemented innovation process should follow. These four concepts provide the theoretical rationale for this study.

First, developers of effective staff development programs suggest that coaching teachers in the implementation phase of a new classroom practice increases teacher use of the innovation (Guskey, 1986; Joyce & Showers, 1982, 1983, 1987). Joyce and Showers (1983) found that only five percent of the teachers they studied were able to incorporate a new strategy without assistance. Sparks (1986) found that peer coaching was an effective strategy to change teaching practices. These studies suggest that the traditional, single meeting inservice on a new approach will not be sufficient to change the practices currently used by teachers.

Second, an effective staff development program must address beliefs and attitudes held by participants. Fullan (1990) states, "The problem of harnessing staff development is compounded by its increasingly sprawling prominence. On the one hand, it is correctly seen as the central strategy for improvement. On the other hand, it is frequently separated artificially from the institutional and personal contexts in which it operates" (p. 4). Thus, ignoring the personal contexts for those persons

involved with innovation adoption limits the effectiveness of staff development efforts for training teachers.

Hord, Rutherford, Huling-Austin, and Hall's (1987) research identified specific phases, entitled Stages of Concern, through which individuals move in the adoption of a new innovation. Concerns are defined as "an aroused state of personal feelings and thoughts about a demand as it is perceived" (Hall, George, & Rutherford, 1979, p. 5). They report that concerns are influenced most by the kinds of support and assistance participants receive as they attempt to implement a new practice (Hord et al., 1987).

In addition, individuals' attitudes toward any innovation can impede or advance the acceptance or rejection of the innovation. An attitude is defined as "a learned predisposition to respond in a consistently favorable or an unfavorable manner with respect to a given object" (Fishbein & Azen, 1975, p. 6). While a person's attitude comprises only one aspect of a person's behavior, Severy (1974) states that "attitudes can be expected to lead to a particular kind of behavior given that the situation and other constraints make the behavior appropriate" (p. 2). Guskey's (1986) theory on teacher change proposes that teachers' beliefs and attitudes are changed only after they are able to experience the innovation in their classrooms. In addition, other factors such as years of teaching experience, grade level taught, and specialized training may affect the adoption of a new practice.

The third concept of effective staff development is the manner in which the new practice is presented to the target audience. The common characteristics of a successful inservice presentation that encourage and sustain change are: (1) the innovation is presented in a clear and an explicit way, in concrete terms rather than abstract; (2) the personal concerns of the teacher must be addressed in a direct and sensitive manner; and (3) the presenter of the innovation is viewed as a credible person by those responsible for implementation of the new practice (Guskey, 1986; Hall & Loucks, 1978; Knowles, 1978).

Finally, an effective staff development practice must recognize the special needs of adult learners. That is, the instruction must shift toward problem-centeredness rather than subject-centeredness (Knowles, 1978; Schlossberg, 1987). Adults are interested in learning relevant information that will assist them in dealing with problems associated with their work.

This research project simultaneously investigated four different staff development strategies using the four previously described concepts. A study that included more than one type of follow-up assistance was believed to permit a stronger comparison of the relative strengths and weaknesses of each procedure. Teachers' attitudes toward curriculum compacting were assessed to determine the influence those attitudes have on the process and, ultimately, teachers' success in using the innovative procedure. Although the length of the study was of a relatively short

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duration, one semester, and should be viewed as a preliminary investigation of the topic, information gained about the specific staff development activities that encourage teachers use of the practice should add to the previous knowledge of the change process in classroom teaching strategies.

Research Questions

The purpose of this study was to examine four different staff development strategies that were used to assist teachers in implementing the curriculum compacting procedure. The second purpose was to explore the role of teachers' attitudes relative to the implementation process. The research questions were:

1. Are there differences among the groups (three treatment and one control) with respect to posttest attitudes after equating groups for initial differences on pretest attitude scores?
2. To what extent and in what manner can variation in teacher attitudes toward curriculum compacting be explained by pretest attitude scores, years of teaching experience, grade level taught, ratings of compacting examples, and the treatment?

Definition of Terms

The following definitions of terms were used in this study:

Curriculum compacting is a process used by teachers in order to better meet the educational needs of above average students by "modifying or 'streamlining' the regular curriculum in order to eliminate repetition of previously mastered material, upgrade the challenge level of the regular curriculum, and provide time for appropriate enrichment and/or acceleration activities while ensuring mastery of basic skills" (Renzulli & Reis, 1985, p. 222).

Staff development "is conceived broadly to include any activity or process intended to improve skills, attitudes, understandings, or performance in present or future roles" (as cited in Fullan, 1990, p. 3).

Innovation is a noun that refers to "the act or process of innovating or something newly introduced; new method, custom, device, etc.; change in the way of doing things" (*Webster's New World Dictionary*, 1978, p. 726).

Peer coaching is a follow-up procedure used to assist persons involved with the implementation of an innovation. In this study, the term refers to a team of two teachers who have chosen to work together to implement a new teaching strategy by sharing their successes and efforts.

Methods and Procedures

Participants

The sample of teachers who served as participants in this research are from a large urban school system. From a pool of 220 teachers who had expressed an interest in teaching for the district's gifted and talented program, 166 teachers representing grades 1-12 participated in the different treatments. The teachers were divided into three treatments and one control group by district administrators according to grade level taught and individual school schedules. There were at least 30 teachers in each of the treatment groups. Additionally, a control group of more than 40 teachers representing all grade levels were randomly selected from an alphabetized list.

Design

This research study used a quasi-experimental design (nonequivalent control group) to compare three different staff development strategies to a control group that did not receive inservice training. Baseline data consisted of an attitude measure using an instrument developed by the researcher and the *Stages of Concern Questionnaire (SoCQ)* (Hall, George, & Rutherford, 1979). Examples of Compactors, a management form developed by Renzulli and Smith (1979), were completed by the teachers and evaluated by experts to establish the quality of the compacting.

Treatment

The researcher delivered the initial inservice presentation to teachers in each treatment group. School personnel conducted an evaluation of each workshop presentation using an evaluation form for inservice training sessions developed by Renzulli (1991) which was completed by all participants. The evaluation data from each group were examined to insure uniformity of training. The initial inservice presentations were approximately one week apart.

The schedule below was used for follow-up activities:

Group 1 (Mail Feedback): One month after the initial workshop, teachers received a questionnaire to determine concerns and questions relative to the implementation of compacting. The researcher responded to the teachers' progress and questions in a letter one week later. This process was to be repeated again approximately ten weeks after the first inservice meeting.

Group 2 (Peer Coaching Teams): Teachers were asked to select another teacher as a coach during the implementation of curriculum compacting. Group 2 teachers received a folder containing a checklist of activities to be

used to document their compacting efforts. These teams were asked to meet at least once every two weeks and no more than two times a week.

Group 3 (District Coach): Two school district supervisory personnel with specialized training in the compacting process acted as consultants for the third group of participants. These consultants met (with individuals or in small groups) at least three times during the semester long study. The researcher was not one of the coaches.

Group 4 (Control): More than 40 teachers (grades 1-12) completed the attitude assessment and the *Stages of Concern Questionnaire* before and after the other groups received treatment to provide a measure of comparison. This group did not receive any training or follow-up.

Data Collection and Analyses

Instrument Development

An instrument developed by the researcher, *Curricular Modification Survey*, was used as a pre and post measure to assess teachers' attitudes toward curriculum compacting. The survey employs a 5-point rating scale and was developed using Gable's (1986) instrument development procedures. After establishing evidence of the instrument's content validity based through literature support and expert judgments, pilot administrations were used to make revisions and establish satisfactory construct validity and alpha reliabilities at or above the .70 level. The three targeted areas for the teachers' attitude measure were: (1) Recognition of Intellectual Differences Among Students; (2) Perceived Support from Others for Making Curricular Modifications; and (3) Teacher Self-Efficacy Toward Making Curricular Modification. These categories were determined from the researcher's involvement with a three year project of providing technical assistance to classroom teachers with curriculum compacting. In addition, the instrument developer contacted the curriculum compacting authors and other trainers for their opinions as to why teachers may or may not be using the procedure. This process follows the recommended practice suggested by Gable (1986) in his book, *Instrument Development in the Affective Domain*.

Evidence of the construct validity of the attitude measure was determined through the use of principal component factor analysis to determine if actual response data from pilot administrations of the instrument corresponded to the targeted categories developed during the content validity process (Gable, 1986). The sample for the pilot testing of the 28 item instrument included 300 teachers.

Data Collection

In addition to the pre and post attitude measure, the *Stages of Concern Questionnaire (SoCQ)* (Hall, George, & Rutherford, 1979) was administered to all participants twice during the semester. The *SoCQ* is a 35-item questionnaire measuring seven stages of concern with regard to the adoption of an innovation. The stages are awareness, informational, personal, management, consequence, collaboration, and refocusing. The alpha reliabilities are .64, .78, .83, .75, .76, .82, .71, respectively for the seven factors. This instrument yields an individual profile and is used for diagnostic purposes only (Hall, George, & Rutherford, 1979). The instrument was used in this study to determine changes that may have resulted from the different treatments. Examples of Compactors were rated by two experts using a holistic scoring system resulting in a score of 1 to 4 with the higher score indicating the best quality. Inter-rater reliability was computed using a concordance index to determine to the amount of agreement among raters (Emmer & Millet, 1970).

Data Analyses

To examine the potential differences of the four groups (three treatment—one control), analysis of covariance with post hoc tests was used on posttest attitude scores after equating the groups using the pretest attitude scores as a covariate. The variation in teachers' attitudes was examined using hierarchical multiple regression analyses to explain the relationships between the independent variables of pretest attitude scores, teaching experience, training, grade level taught, compacting examples, and treatment to predict the posttest attitude measure. The treatment groups were dummy coded for analysis as follows: Group 1(100), Group 2 (010), Group 3 (001), and Group 4 (000).

A series of one-way ANOVAs with the Scheffé post hoc test for unequal sample sizes were run to determine if there were significant group differences prior to treatment. The results indicated that there was not group equivalence on three of the predictor variables. In particular, based on group means, treatment Group 1 was significantly different from all groups on the number of graduate credits in gifted and talented education ($p < .01$). Group 1 was also different from Groups 2 and 4 on the number of years teaching experience ($p < .05$). These results indicated that the Group 1 teachers appear to be a sample of more experienced and highly trained educators as compared to the other groups of teachers in the study. In order to decrease the influence of these significant variables for Group 1 teachers, these predictor variables were converted to standard scores (z scores) and entered first in the regression analyses as covariates.

The inspection of the predictor variable of grade level taught also revealed that the groups were not equivalent. This independent variable was particularly problematic. The Scheffé post hoc test revealed that Group 3 was significantly different from all other groups, while Group 4 was significantly different from

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Groups 1 and 2 ($p < .05$). While it would be logical for one to assume that the grade level taught could influence teachers' attitudes toward curriculum compacting, the variable was determined to be unique to the intact groups of teachers investigated and subsequently dropped from further analysis. The primary reason for this decision was that the method used to create the groups for the study along with the specific coding of the grade level taught caused this variable to be skewed; and therefore, was not a variable that could be used as a covariate in the regression analyses. For logistical and practical purposes, teachers were placed into training groups based on the grade level they taught by district personnel. Inservice and staff development presenters frequently find complaining participants when the grade levels represented are too broad in a large group training session. A study conducted by Tomlinson (1986) cited the following from a respondent concerning the least beneficial gifted education inservice technique: "Workshops which attempt to handle elementary and secondary needs as though they were the same [were the least beneficial]. . . ." (p. 112). Group 1 and Group 2 contained elementary (grades K-6) teachers only. Group 3 was comprised of secondary (grade 7-12) teachers only. The teachers' grade level was coded by category since many of the teachers taught across grade levels [for example, K-3 was coded (1), 4-6 (2), 7-8 (3), 9-12 (4)]. The control Group 4 was the only group that was comprised of teachers from all of the grade levels represented in the study. Therefore, the variable of grade level taught was not one that could be used to equate the groups, since the groups investigated, with the exception of the control group, did not contain teachers from all grade levels. In light of this finding, the researcher dropped this variable from the original research question and subsequent analyses.

The ratings of Compactors were examined using an ANOVA procedure for the three treatment groups. There were no significant differences among the groups. The resulting F-ratio of 1.4942 with degrees of freedom (2,44) had a probability level $p < .236$.

The pretest scores of the *Curricular Modification Survey* were examined using an ANOVA procedure. There were no significant differences among the groups. Although there were no significant differences on the pretest measure, the researcher decided to use the scores of the pretest as a covariate since the posttest was the identical instrument. The means and standard deviations for the predictor variables can be found in Table 1.

Research Question #1

The analyses for the first research question concerned group differences on the posttest attitude measure after equating the groups on their pretest scores. An ANCOVA procedure revealed that there were no significant differences among the groups ($N=117$). These results were not surprising since there were no differences among the groups with respect to the pretest scores. A display of the ANCOVA results can be found in Table 2.

Table 1

Predictor Variables: Means, Standard Deviations, Significance Results

	Groups (N's)							
	1 (32)		2 (48)		3 (41)		4 (45)	
	Mean	s	Mean	s	Mean	s	Mean	s
z GTCredits ¹	1.289	1.219	-.321	.562	-.325	.796	-.278	.541
z Years Exp ²	.546	.864	-.126	.891	-.089	1.219	-.173	.863
Grade ³	1.781	.420	1.625	.489	3.487	.506	2.33	.954
Pretest ⁴	61.34	7.13	58.06	8.35	58.56	7.03	57.35	7.04
Ratings of	(N=12)		(N=21)		(N=14)			
Compactors ⁵	3.21	.66	2.83	.78	2.27	.80		

Notes: Analysis: One-way ANOVA with Scheffé

- 1 Group 1 different from Groups 2, 3, 4 $p < .01$
- 2 Group 1 different from Groups 2, 4 $p < .05$
- 3 Group 3 different from Groups 1, 2, 4 $p < .05$
Group 4 different from Groups 1, 2 $p < .05$
- 4 The mean and standard deviation for Group 4 (control) was calculated using 26 cases only due to missing data
- 5 These scores were obtained from the two ratings of the Compactors. Group 4 teachers were not requested to complete the form since they did not receive training or follow-up assistance.

Group was dummy coded as follows:

Group 1 = 100 Group 2 = 010 Group 3 = 001 Group 4 = 000

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Table 2

Analysis of Covariance: Comparison of Groups on Posttest Attitudes Scores

Source of Variation	SS	df	MS	F-ratio	F-prob.
Covariate (Pretest)	2122.645	1	2122.645	88.948	.001
Main Effects (Group)	186.734	3	62.245	2.608	.055
Error	2672.741	112	23.864		
Total	4982.120	116	42.949		

Research Question #2

The second research question focused on the relationship among the groups and the subjects' posttest attitude scores. Specifically, this question asked: To what extent and in what manner can variation in teachers' attitudes toward curriculum compacting be explained by pretest attitude scores, years of teaching experience, number of graduate gifted education credits, ratings of Compactors, and treatment?

Multiple hierarchical regression was selected as the statistical procedure for analyzing the second research question in the study. Multiple regression allows the dependent variable to be compared with continuous and dichotomous variables. Hierarchical regression also enables the researcher to hold one or more independent variables constant while examining the relationship of group membership and the dependent variable, and allows for an assessment of each independent variable in terms of its contribution to the regression equation at its point of entry.

The SPSS-X Regression procedure was employed to analyze this question. The listwise command for missing data was employed, therefore, only those cases that had data for all variables in the regression equation were used in the analyses. The dependent variable was teachers' attitudes toward curriculum compacting and the independent variables were entered in the following order: a block comprised of pretest scores, number of graduate gifted education credits, and number of years of teaching experience at the first step, average Compactor ratings at the second step, and group membership at the third step. The order of entry for the dependent variables was based on the following rationale.

The number of years of teaching experience and number of graduate gifted education credits were found to be significant for Group 1 during the preliminary phase of data analyses. In addition, the significant moderate correlation of teachers' pretest scores with the dependent measure indicated that this variable should also be

entered first. The three variables were entered as a block in order to hold their effects constant. The average rating for the Compactors was entered next in order to examine if there was a quality component of the treatment before group was entered in the analysis. The final variable was entered to ascertain whether treatment explained variation in teachers' posttest attitude scores.

The correlation matrix for variables in this regression model are shown in Table 3. Significant bivariate correlations were found between the dependent variable and the following predictor variables: pretest scores, number of graduate gifted education credits, years of teaching experience, and average rating of compactors ($p < .05$).

Results for Question #2

The results of the regression analysis for assessing teachers' attitudes toward curriculum compacting are shown in Table 4. After the pretest scores, number of years of teaching experience, and number of graduate gifted education credits were entered in the first step, average rating of compactors was entered. The addition of the rating variable and group did not significantly add to the equation. For each of the variables entered, the table provides the multiple correlation coefficient (Mult R), the squared multiple correlation (R^2), and the adjusted squared multiple correlation coefficient (adjusted R^2). The adjusted R^2 , or the shrunken squared multiple correlation coefficient, adjusts for an inflation in the size of the squared multiple correlation coefficient and, therefore, represents a better estimate of the actual size of R^2 . The table also reports the unstandardized regression weights (variables in raw or deviation score form) (b), the standardized regression weights (variables in standard score form, with means and standard deviations equalized among the variables) (B), and the significance values for the b weights (t).

Discussion of Research Question #2

The regression analysis indicated that neither the ratings of Compactors or group membership predicted posttest attitude scores. These results, however, were not surprising upon closer inspection of the variables. The number of compactors evaluated was $N=47$. The low number of Compactors severely affected the $N:p$ ratio for the regression analysis. The assumption had been that the majority of teachers in the study would complete the form. The lack of actual cases for this variable caused the resulting $N=46$ for the regression analyses (one compactor was eliminated). Therefore, this analysis could only examine the predictor variables on a subsample of the teachers studied. In light of this unexpected occurrence, the results for this research on Compactors were used to further examine the data.

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Table 3

Correlation Coefficients of Variables Related to Research Question #2¹

	CMSpost	CMSpre	ZG/Tcredit	Zyrsexp	Avg-Comp.
CMSpost	1.00 (130)	.653*** (117)	.181* (130)	.156* (130)	.407** (46)
CMSpre	.653*** (117)	1.00 (147)	.199** (147)	.124 (147)	.341** (47)
ZG/Tcredit	.182* (130)	.199** (147)	1.00 (166)	.240*** (166)	.347** (47)
Zyrsexp	.157* (130)	.124 (147)	.240*** (166)	1.00 (166)	.200 (47)
Avg-Comp.	.407** (46)	.341** (47)	.347** (47)	.200 (47)	1.00 (47)

* $p < .05$ ** $p < .01$ *** $p < .001$

¹Note: Missing = include (N)

Table 4

Summary Statistics for the Hierarchical Multiple Regression on Teachers' Attitudes Towards Curriculum Compacting as Measured by the Curricular Modification Survey (N=46)

Step	Variable	Mult R	Rsqr	Adj Rsqr	b	Beta	t
1	Zyrsexperience				-.239	-.048	-.404
	Pretest				.553	.685	5.877*
	Zgtcredits				.785	.001	.011
		.677	.459	.420			
2	Average Compactor	.708	.501	.453	1.76	.232	1.867
3	Group	.709	.502	.440	.006	.043	.298

* $p < .001$

Note: The variables below the line did not significantly add to the model.

Research Question #3

A revised research question was used to further analyze the data gathered in the study. A third research question asked: To what extent and in what manner can variation in teachers' attitudes toward curriculum compacting be explained by pretest scores, number of years of teaching experience, number of graduate gifted education credits, and group membership?

Again, the SPSS-X Regression procedure was employed to analyze the question. The dependent variable was the posttest scores on the attitude measure and the independent variables were entered in the following order: a block comprised of the number of years of teaching experience, number of graduate gifted education credits, and the pretest scores on the attitude measure on the first step. Group (treatment) was entered on the second step. The rationale for the block of variables remained from the analysis of the second research question.

Results for Question #3

A display of the results from the regression analysis for assessing teachers' attitudes is shown in Table 5. After the initial block of variables was entered the addition of the group variable did not significantly add to the equation. The

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researcher suspected that the uniqueness of Group 1 on all of the variables except the pretest scores may have affected the analysis. In particular, the evaluation of training by this group of teachers, as previously described, may have affected the examination of the treatment of Group 1 with respect to teachers' attitudes. A second regression analysis was conducted eliminating Group 1 subjects.

The same order of entry was used for the follow-up analysis excluding Group 1 teachers. The results of this analysis are shown in Table 6. The elimination of Group 1 teachers significantly altered the results from the previous regression procedure. It would appear that the treatment did have some influence in predicting teachers' attitude scores toward curriculum compacting. The two regression procedures were compared to examine more closely the multiple correlation coefficient (Mult R), the squared multiple correlation coefficient (R^2) and the significance value for the regression weights (b's). Both of the regression analyses indicated that the block of independent variables was significant; however, the significance values for the regression weights for the number of years of teaching experience and number of graduate gifted education credits were not at significant levels. This finding supported the previously described problems with the formation of the groups in the study. It would appear that the number of extreme scores from the sample for these two predictor variables do not help to explain teachers' attitudes.

Table 5

Summary Statistics for the Hierarchical Multiple Regression on Teachers' Attitudes Towards Curriculum Compacting as Measured by the *Curricular Modification Survey* (N=117)

Step	Variable	Mult R	Rsqr	Adj Rsqr	b	Beta	t
1	Zgtcredits	.656	.431	.416	.379	.062	.842
	Zyrsexp				.467	.025	.342
	Pretest				.543	.636	8.715*
2	Group	.656	.431	.411	-.001	-.006	-.070

* $p < .001$

Note: The variables below the line did not significantly add to the model.

Table 6

Summary Statistics for the Hierarchical Multiple Regression on Teachers' Attitudes Towards Curriculum Compacting as Measured by the Curricular Modification Survey (N=90)¹

Step	Variable	Mult R	Rsqr	Adj Rsqr	b	Beta	t
1	Zgtcredits	.636	.404	.383	.104	.011	.133
	Zyrsexp				-.087	-.014	-.163
	Pretest				.537	.637	7.557**
2	Group	.665	.442	.415	.271	.194	2.394*

* $p < .05$

** $p < .001$

¹ Note: These results do not include subjects from treatment Group 1.

Another regression analysis was conducted eliminating the predictor variables of number of years of teaching experience and number of graduate gifted education credits to provide a more accurate prediction of teachers' attitudes toward curriculum compacting. The results of this analysis can be found in Table 7. In order to determine which groups were significantly different from one another, an ANCOVA procedure was conducted to obtain the adjusted means for the posttest scores using the pretest as a covariate. The pooled-variance t-test was used on possible pairs of groups. Although, the N's for each cell were not equal, the results of the F-max test revealed equal variances. Group 2 (Peer Coaching) teachers were found to be significantly different from Group 4 (Control) at the $p < .05$ level.

Discussion of Research Question #3

The results from the regression analysis indicate that 44% of the variance in teachers' attitudes toward curriculum compacting can be explained by pretest attitudes and training with follow-up assistance. However, it should be noted that the majority of the variance (40%) is explained by pretest scores alone before training or follow-up. This would indicate that the strength of the treatments investigated may not have been sufficiently implemented to determine their effects. It would also appear that the pretest scores may have produced a ceiling effect in that very little variance was left to be accounted for in predicting posttest scores. The mean pretest scores for the three groups were 58.06, 58.56, and 57.34, respectively. The total possible score for the affective instrument is 75.00, therefore, it would appear that the pretests reflected generally positive attitudes toward making curricular modifications prior to treatment.

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Table 7

Summary Statistics for Hierarchical Multiple Regression on Teachers' Attitudes Towards Curriculum Compacting as Measured by the *Curricular Modification Survey* (N=90)¹

Step	Variable	Mult R	Rsqr	Adj Rsqr	b	Beta	t
1	Pretest	.635	.404	.397	.530	.629	7.83**
2	Group	.664	.441	.428	.270	.194	2.41*

* $p < .05$ ** $p < .001$

¹ Note: These results do not include subjects from treatment Group 1.

After eliminating the treatment Group 1 teachers, the results of the analysis revealed that the Peer Coaching Teachers (Group 2) did significantly differ from the Control Group (Group 4). This would indicate that this group's follow-up assistance was more effective than the District Coach Teachers (Group 3) when using teacher attitudes as the dependent measure for the sample studied.

Additional Analyses

Stages of Concern Results

In order to examine the differences of the groups for specific concerns they had before and after the treatment, the *Stages of Concern Questionnaire* (Hall et al., 1979) was administered. Mean scores for each of the seven stages for each group were computed. The results of the questionnaire provide information concerning the implementation of curriculum compacting that can be determined by examining the relative intensity of respondents' scores for each stage of concern. For example, it would be expected that most teachers would be primarily concerned with personal issues during the pilot phase of innovation adoption. Questions like, "How will this innovation affect me?" would be common. The pre-treatment results for sample of teachers investigated can be found in Figure 1 and the post-treatment results are displayed in Figure 2.

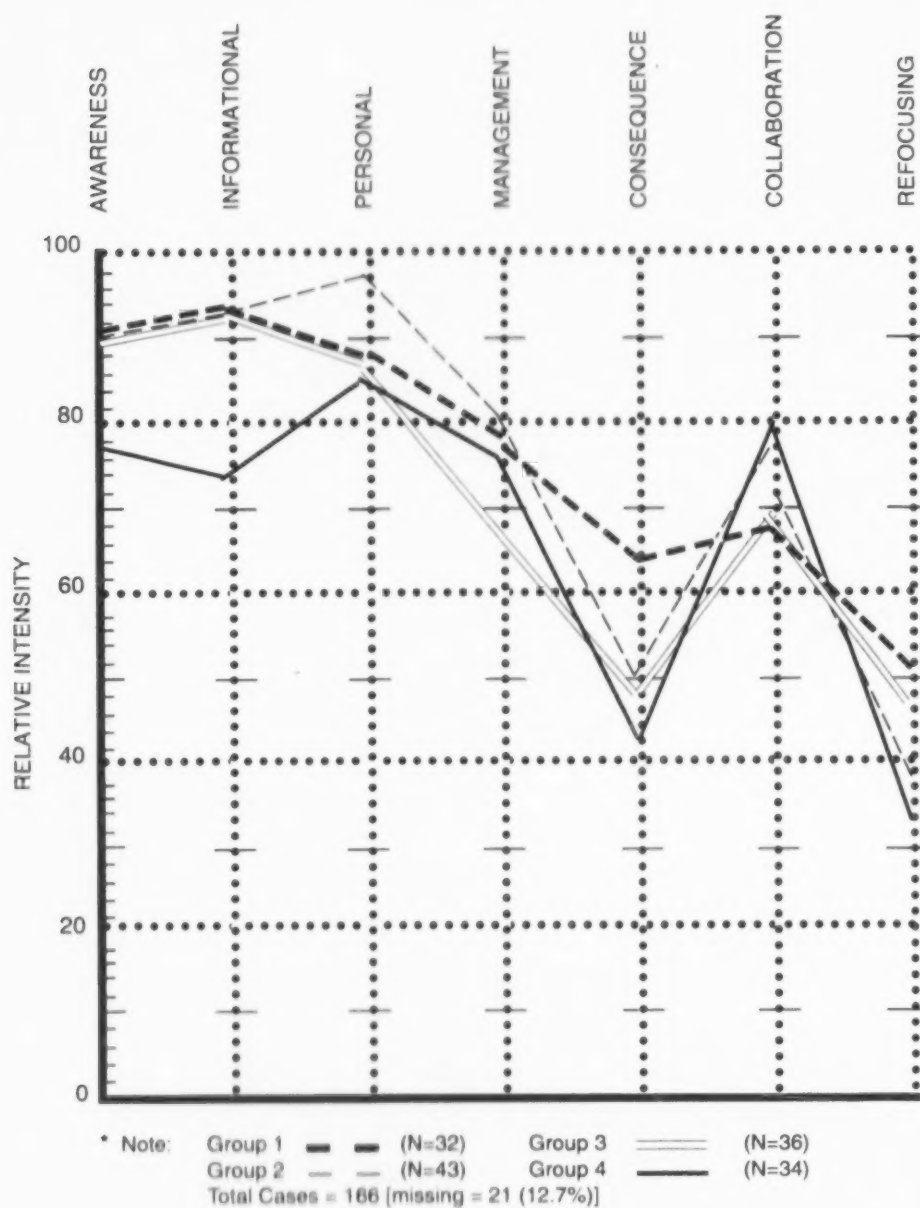


Figure 1. Stages of Concern profile by groups before treatment*

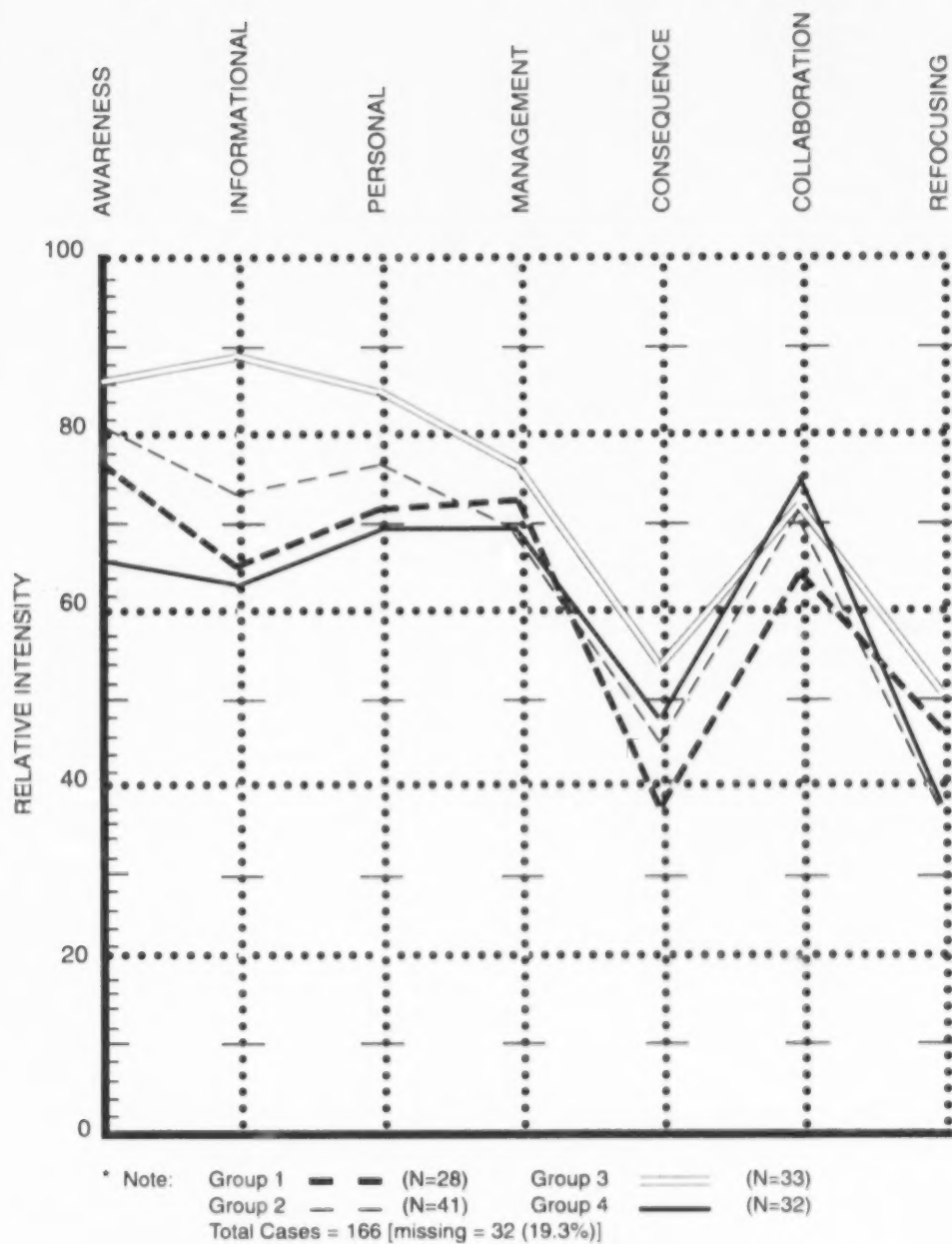


Figure 2. Stages of Concern profile by groups after treatment*

The pretest results of the profile data indicate that the stages of Awareness, Informational, and Personal concerns received the highest mean scores for all groups. By examining the peaks of the mean scores, the next highest stage of concern for teachers prior to training was the stage of Collaboration. During the Collaboration stage of concern the "focus is on increasing impact on clients through collaboration with others regarding use of the innovation" (Hall et al., 1979). This finding would indicate a willingness by teachers to implement the new practice by having an opportunity to work with others concerning innovation use. However, the authors of the Concerns Based Adoption Model state that persons are not able to reach this stage until the personal concerns and the specific skills needed to implement the tasks have been fulfilled (Hall et al., 1979).

The posttest results of the profile indicate that for all treatment groups the stages of Awareness, Informational, and Personal concerns have decreased in their intensity when compared to the prior training results. The control group responses would indicate that their knowledge with regard to the process of curriculum compacting (the innovation studied) has not been fulfilled. The mean scores for Group 4 (control) for these levels were quite similar. These results would indicate that there had not been any information given to this group of teachers pertaining to the topic of curriculum compacting. The researcher found several additional comments made by the control group teachers on the returned questionnaire. Comments such as, "I have not been to the curriculum compacting workshop yet" and "I don't know any more about compacting than I did the last time I filled out this form" were written on the bottom of the questionnaire by several of the teachers. Interestingly, the stage of concern of Management decreased in intensity from the pretest results. However, the peaks of the mean scores for the Management stage for Groups 1 and 3 would indicate that these teachers are concerned with the organization, scheduling, and time demands made by using curriculum compacting. These teachers would be more likely to be actually using the process than teachers who were still primarily concerned with personal issues. However, the personal concerns for all teachers implementing the compacting process are supported by the *SoCQ* posttest results.

Curriculum Compacting Logs

Informal data were gathered through the Compacting Logs that Group 2 teachers had been asked to complete as documentation of the Peer Coaching follow-up assistance. However, it is difficult to determine how much of the Peer Coaching strategy was actually implemented since only 7 of the 24 (29%) pairs of teachers returned their Logs. The majority of the comments made by these teachers in the general comments section of the form explained how they believed the implementation of compacting would be easier next year. For example, one teacher wrote "Too many programs happening at once" [sic]. A similar comment was made by another teacher when she stated "Too difficult to start at this time of the year with other responsibilities and lack of enrichment resource materials. I am very encouraged about using compacting next year. I think it's great!!"

The same Compacting Logs were used for Group 3 (District Coach follow-up assistance) by two of the program specialists from the district's program for the gifted and talented office. Again, it is difficult to determine how much of this strategy was implemented since only 21 out of the 41 (52%) teachers met with one of the program specialists. However, ten of the teachers made two visits to meet with the coaches. The information documented by the program specialists was similar to that obtained from the Group 2 teachers. For example, one program specialist wrote about a meeting with a grade 8 teacher and said: "She seems overwhelmed by implementing this approach at this point in the school year." The other program specialist wrote that a high school social studies "teacher sees value in this strategy" but did not indicate any specific areas on the form that would offer support to the teacher actually using the procedure. The lack of implementation data to gain more insights into the implementation process of curriculum compacting was disappointing. However, the time of the year for the implementation of a new teaching practice does appear to influence actual use of the practice.

Discussion

The purpose of this study was to examine an effective training method for encouraging teacher use of curriculum compacting. While the treatment was associated with a small, but significant increase in predicting teachers' attitudes after eliminating one treatment group, actual implementation of the procedure remains unknown. While the District Coach treatment group was not significant, it is worth speculating about possible causes for this outcome and what those explanations suggest for further training efforts, as well as further research to explore teachers' use of curriculum compacting.

Implications for Training and Follow-up

The implications for training teachers in the rationale, methods, and procedures of curriculum compacting are twofold. First, although the staff development literature suggests that a one-time inservice presentation is not enough to change the teaching practices of educators, the amount of time and the methods used to convey specific information during a full day session with particular groups, may indeed result in influencing certain teachers' decisions to implement the practice. In this study, the Peer Coaching treatment group was significantly different than the control group of teachers with respect to their attitudes toward curriculum compacting. If teachers' attitudes are reflective of their beliefs and actions, one could hypothesize that an initial attempt to use curriculum compacting was implemented by the Peer Coaching teachers. However, the information provided by those teachers to document the extent to which they used the procedure was negligible.

Second, the types of follow-up to training used in this study were based on suggestions from the staff development literature and expert advice from educators who have had extensive experience with the process. However, since no other study has investigated teachers' use of curriculum compacting, it is difficult to determine if the follow-up treatments investigated were effective when examining implementation of curriculum compacting given the length of the study. It is conceivable that the follow-up treatments are effective in encouraging teachers' use of the compacting process, however, the results of this study do not provide such information.

A final implication of this study relates to the population of subjects used in this investigation. Teachers of the gifted are assumed to believe in the unique learning needs of high ability students, however, knowledge of how to provide appropriate instruction to these youngsters may require specialized training. The teachers of the gifted in this study were in the process of implementing several components of a new program for the gifted and talented. The confusion with learning several procedures, strategies, and policies could limit the extent to which the progress of all components is able to be examined. Teachers may have had to forego their good intentions with regard to changing the curriculum for advanced ability students, in order to meet more urgent deadlines demanded by the implementation of a large school district program designed to meet the needs of gifted or potentially gifted students. This study used the *Stages of Concern Questionnaire* to examine the personal concerns of participants, however, it is possible that not enough attention was given to those concerns to influence teachers' attitudes and/or practice.

Implications for Future Research

Several questions remain with regard to how to encourage and assess teachers' use of curriculum compacting. The fact that the variables in this study only accounted for 44% of the variance in predicting teachers' attitudes toward making curricular modifications for high ability students suggest that other factors need to be investigated. Among those possibilities are different instruments, additional variables, and research designs.

Limitations and Delimitations

A limitation of this study was the use of a preselected group of teachers who were interested in working with above average students. Experimental mortality was also a threat since some teachers chose not to participate due to the amount of follow-up involved in the study. Threats of history and maturation were not a factor in this study since all teachers were from the same district; however, careful documentation of any specialized activities within individual schools were reported to insure that these factors did not jeopardize the internal validity of the study. Self-report

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measures do constitute a threat to internal validity. It is difficult to determine if the self-report data reflect the views that participants actually hold.

The threats to external validity according to Campbell and Stanley (1966) are: interaction effects of selection biases and the experimental variable, reactive effects of pretesting, reactive effects of research procedures, and multiple treatment interference. Since this study involved participants selected by district personnel, caution should be used in generalizing beyond such groups. Finally, the pretest may have an interaction or reactive effect on the posttest and therefore cannot be generalized to populations who do not receive the pretest.

Summary

The importance of what happens to high ability students every day in school classrooms is a concern not only to students and parents, but also to classroom teachers. Teachers who work with above average ability students realize that different students require different strategies to adequately meet their educational needs. Curriculum compacting is one strategy that assists teachers of these students in meeting those needs. The process of teachers obtaining the skills and procedures necessary in providing an appropriate education to high ability youngsters adds to the body of knowledge of good teaching methods. While this study did not reveal a succinct format for increasing teacher use of the procedure, the results do increase our understanding of the variables that may inhibit or enhance educators add to the ability of curriculum compacting to their repertoire of teaching strategies.

This study examined how teachers acquire the skills necessary to implement curriculum compacting in the classroom and should provide school personnel with information regarding successful procedures for adopting this innovation for the bright students in their district. Further, it examined the personological variables of those teachers actually using the practice of curriculum compacting, and will, therefore, provide additional information concerning which teachers may need more or less assistance in order to incorporate the strategy in their classrooms.

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